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ABSTRACT

This report evaluates current health manpower shortage area (HMSA) designation criteria against defined standards and program objectives, assesses possible alternatives and improvements to those criteria, and examines possible approaches to, and feasibility, of measuring demand and predicting the likelihood that unmet demand in an area will be met within 2 years. HMSA's are defined by federal legislation to include urban and rural geographic areas, population groups, and facilities with shortages of health manpower. The report is organized into three major parts. Part 1 provides essential background information on HMSA criteria and designation process. Part 2 presents results of the detailed technical analysis undertaken. Part 3 presents major conclusions and provides a series of recommendations, both for specific improvements in the HMSA criteria and for further research. The most important conclusion emerging from the findings is that the HMSA criteria performed best of the various alternatives in terms of measuring the basic shortage concept they were designed to measure--the density of physicians in an area. (Provided in appendices are detailed tables and other exhibits relevant to analyses presented in the body of the report.) (BC)

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A REPORT TO CONGRESS ON THE EVALUATION OF HEALTH MANPOWER SHORTAGE AREA CRITERIA

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A REPORT TO CONGRESS ON THE EVALUATION OF HEALTH MANPOWER SHORTAGE AREA CRITERIA

September 1983

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
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Health Care Delivery and Assistance; (2) the Utilization Deficit Index (UDI), developed by Joel Kleinman of the National Center for Health Statistics; (3) the Deaths Averted Index (DAMI), developed by Jack Hadley of the Urban Institute; and (4) the Use/Need Index, also developed by Jack Hadley. The HMSA criteria stress availability, while the UDI, the DAMI, and the Use/Need Index all emphasize health status and health care utilization.

The IMU considers both availability and health status measures. Although each of these indices involves a combination of several quite different factors, the manner in which the factors are combined differs appreciably across the indices.

In this research effort, the HMSA criteria and the four alternatives were evaluated against the same standards, and the whole-county shortage area designations which would be produced by each alternative method were compared with and contrasted to those actually made using the HMSA criteria. The alternatives were assessed on how well they rank all counties throughout the United States in terms of measures of the different shortage dimensions or concepts of interest (need, access, health status, utilization, insufficient capacity, manpower availability); how well they deal with multiple objectives for designating shortage areas; and their validity in terms of the logical consistency and credibility of the assumptions upon which they are based. Although many of the HMSA designations occur at the subcounty level, especially in urban areas, it was not possible to evaluate the alternative criteria at this level because the necessary data are not available on a nationwide basis.

An important result of the analysis was the finding that a significant core group of the same counties are identified using each of the methods. These counties are predominantly poor, rural counties in the South. On the other hand, when the remaining counties identified by the different alternatives were examined, it was found that each would designate substantially different groups of counties as shortage areas. The disagreements among the alternatives appeared to be due primarily to differences in the shortage concepts each emphasized and attempted to measure. Yet there is little discrimination in terms of identifiable characteristics of counties designated by the different alternatives; the latter bear little relation to independent measures of the type of shortage they were presumably designed to identify.

Counties could be ranked with acceptable precision in terms of relative availability of health manpower using the HMSA criteria, but all of the other designation schemes based on health status and underutilization yielded ambiguous results. Those methods which attempted to address multiple goals simultaneously by combining a number of measures tended to confound multiple goals and therefore to rank counties ambiguously in terms of particular considerations.

The second major effort undertaken for this study was related to the issue of the performance of the HMSA criteria. An attempt was made to determine the extent to which they are accurately applied. Two types of designation errors were considered. An error of omission (or "false negative") occurs if a county which would qualify for designation is not designated. It is difficult

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EXECUTIVE SUMMARY

Evaluation of Health Manpower Shortage Area Criteria

This report on an evaluation of health manpower shortage area criteria is submitted pursuant to Section 2702, paragraph (c) of Public Law 97-35 (The Omnibus Reconciliation Act of 1981). It fulfills the congressional directive to (1) evaluate the criteria used under section 332(b) of the Public Health Service Act to determine if the use of the criteria has resulted in areas which do not have a shortage of health professions personnel being designated as health manpower shortage areas; and (2) consider different criteria (including the actual use of health professions personnel in an area by the residents of an area taking into account their health status and indicators of an unmet demand and the likelihood that such demand would not be met in two years) which may be used to designate health manpower shortage areas.

Congressional mandates included in successive pieces of legislation since 1971 have placed different requirements on the content and intent of the shortage criteria. Originally, the criteria were designed primarily to be indicative of the general levels of availability of health manpower in local areas and were based almost exclusively on practitioner-to-population ratios. In 1976, the Health Professions Educational Assistance Act of Congress instructed that the criteria had to be indicative of relative degrees of need as well; specifically, the criteria had to consider infant mortality, access to health services, and health status of the population. The 1981 legislative mandate for this Report suggests that the criteria should perhaps also consider indicators of unmet demand.

As the report notes, it is clear that significant increases in the national supply of physicians in recent years have resulted in the "diffusion" of increasing numbers of physicians into non-metropolitan areas. This underlines the importance of examining the HMSA designations to determine whether there has been an influx of physicians into some of these areas since the time of designation. It is also important to examine the criteria for and process of designation to determine whether they are sufficiently responsive to changes resulting from diffusion and other factors. In this regard, a related study is worth mentioning. This study, "Diffusion and the Changing Distribution of Primary Care Physicians," was undertaken to assess the impact of the geographic diffusion of primary care physicians on the need for National Health Service Corps (NHSC) physicians during the 1984-1994 period. Combining the county and subcounty forecasts the total number of shortage areas is expected to decline by almost 50 percent. The report's conclusion is that the diffusion of primary care physicians is expected to reduce overall shortage area needs in the next decade, but that needs may persist in many currently designated shortage areas.

In order to address the congressional mandate in Public Law 97-35, a major research effort was undertaken to examine alternative criteria and to identify the consequences for the HMSA designation program if alternative criteria were selected. Several alternatives have been proposed by researchers in this field. The alternative methods examined in this report are:
(1) the Index of Medical Underservice (IMU), used in the designation of Medically Underserved Areas for primary care grant programs by the Bureau of

to assess the extent to which this error occurs, since locally verified data are not available for counties which do not apply for designation. Nevertheless, using published, unadjusted data, only 9 counties were identified as possible errors of omission. An error of commission (or "false positive") would occur if a county were designated without justification. Only 20 counties out of 346 currently designated were found to be inappropriately designated.

The various technical aspects of the HMSA criteria were also critically examined to determine whether cutoff levels developed in previous years were still appropriate when reassessed with current data. Included were consideration of approaches for determining rational service areas, the methods for estimating the population and the numbers of practitioners available, measures of high need and insufficient capacity, and the population-to-practitioner cutoff levels for designation. On the whole, it was determined that underlying conditions have not changed enough since the cutoff levels were established to warrant changes in them, especially in view of the wide-ranging disruptive effects that making small changes in the quantitative levels would have on programs that make use of the HMSA designations. The study also found that some of the finer adjustments in the criteria did not appreciably alter the areas selected under the designation process and could therefore be reduced or eliminated.

Among the technical aspects of the criteria considered was the definition of primary care physicians used. The Report notes that some primary care is probably delivered by specialists not included in the current definition. However, some specialists included in the current definition probably do not spend all of their time in primary care, but render some subspecialty care. Consequently, the Report concludes that the current definition of primary care physicians is adequate for designations except that consideration should be given to possible inclusion of general surgeons.

An important component of the overall congressional charge for this evaluation was to examine methods for assessing unmet demand of an area and whether or not such demand will be met within two years. The report concluded that the definition and measurement of unmet demand in the context of shortage area designation is an extremely complex problem, especially in view of the data limitations faced by the designation program. No technically acceptable methodology for dealing with the measurement of unmet demand and no approach for predicting whether such demand will be met during a particular time-frame has yet been identified.

A major exception to the general conclusion regarding acceptability of the current criteria involves the "degree-of-shortage" levels used to group designated areas in terms of levels of need, groupings which play a major role in allocating NHSC personnel to designated areas throughout the nation. The evaluation found that the degree-of-shortage groupings are not satisfactory from several standpoints. They give undue importance to differences in practitioner-to-population ratios and certain measures of unmet need; do not consider the size of affected populations; and do not take into account unmet demand or area attractiveness. In addition, the process for developing priorities among designated areas using the existing degree-of-shortage groupings does not give sufficient consideration to the different characteristics of different programs using the designations (e.g., federally-salaried NHSC vs. private practice option).

Efforts to develop better degree-of-shortage groupings have been initiated since the time the basic analysis for the Report was done, but are not yet complete. However, data on the relative rankings of designated HMSAs on a number of indicators representing aspects of need, demand, and attractiveness have been developed for use in the NHSC placement process. A comprehensive review of all proposed new matches of NHSC personnel was undertaken for fiscal year 1983. This reassessment of NHSC placement policy was designed to target the limited number of federally salaried health professionals into HMSAs of high need and low attractiveness. This policy is supported by section 333(a)(1)(D)(IV) of the Public Health Service Act which requires the Secretary to consider a site's ability to recruit health manpower in assigning NHSC personnel.

The most important conclusion that emerges from the findings of the evaluation is that the HMSA criteria performed best of the various alternatives in terms of measuring the basic shortage concept they were designed to measure--the relative availability of health manpower. Furthermore, the concepts of shortage that the other methods do measure are not clearly associated with the density of physicians in an area. Consequently, the HMSA criteria were determined to be the criteria of choice if an availability concept of shortage is to be emphasized. Nevertheless, the report recognizes the importance of other related shortage concepts and recommends their continued use as subsidiary criteria, particularly in determining priorities for placement among areas with availability shortages.

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INTRODUCTION

Section 2702, paragraph (c) of Public Law 97-35 (The Omnibus Reconciliation Act of 1981) requires the Secretary of Health and Human Services to: (1) evaluate the criteria used under section 332(b) of the Public Health Service Act to determine if the use of the criteria has resulted in areas which do not have a shortage of health professions personnel being designated as health manpower shortages areas; and (2) consider different criteria (including the actual use of health professions personnel in an area by the residents of an area taking into account their health status and indicators of an unmet demand and the likelihood that such demand would not be met in two years) which may be used to designate health manpower shortage areas.

The Secretary is required to report to the Congress the results of the activities undertaken under this subsection not later than November 30, 1982. This report is submitted as fulfillment of the congressional directive.

The report (1) evaluates the current Health Manpower Shortage Area (HMSA) designation criteria against defined standards and program objectives, (2) assesses possible alternatives and improvements to those criteria, and (3) examines the possible approaches to and feasibility of measuring demand and predicting the likelihood that unmet demand in an area will be met within two years.

The legislative basis and program objectives for health manpower shortage area designation arise from Section 332 of the Public Health Service Act (as amended). That Section requires the Secretary of Health and Human Services to designate health manpower shortage areas based on criteria established by regulation. Health manpower shortage areas are defined by the legislation to include (1) urban and rural geographic areas, (2) population groups, and (3) facilities with shortages of health manpower. Public or non-profit entities in (or with a demonstrated interest in) these areas are eligible to apply for assignment of National Health Service Corps (NHSC) personnel to provide health services in, or to, the areas. These areas are also eligible service obligation areas for certain Public Health Service scholarships, loan repayment, and nurse practitioner traineeship programs, and entities located in the areas are eligible to apply for (or receive preference for) certain Public Health Service grant programs.

In establishing the criteria for the designation of areas, population groups, and health care facilities as health manpower shortage areas, Section 332 requires the Secretary to take into consideration a number of factors, among which are the following:

> (1) The ratio of available health manpower to the number of individuals in an area or population group, or served by a medical facility or other public facility under consideration for designation.

(2) Indicators of a need, notwithstanding the supply of health manpower, for health services for the individuals in the area, or special population group, or served by the health care facility, with special consideration to indicators of infant mortality, access to health services, and health status.

(3) The percentage of physicians serving the area, special population group, or health care facility who are employed by hospitals and who are graduates of foreign medical schools.

Section 332 also requires the Secretary to take into consideration the recommendations of specific agencies or interested parties in determining whether to make a designation, and to provide them written notice of the designation after it is made. These include:

(1) The health systems agency (designated under section 1515) for the health service area which includes all or any part of the area, population group, or facility under consideration for designation.

(2) The State health planning and development agency (designated under section 1521) if the area, population group, or facility is within a health service area for which no health systems agency has been designated.

(3) The Governor of each State in which the area, population group, or facility is located.

(4) Appropriate public or private nonprofit entities which are located in or have a demonstrated interest in the area.

The Health Resources and Services Administration's Bureau of Health Professions has been assigned the responsibility for designating these areas.

In order to meet the present congressional mandate--to evaluate the shortage area designation criteria developed to address the legislative requirements of Section 332 and to consider other criteria--a wide variety of studies and reports relevant to the issues raised in the congressional mandate were examined. The study also developed new information to supplement and advance previous evaluations of the current HMSA criteria and designation procedures and to address recent comments on them. Several possible alternatives to the current criteria are also described and discussed in detail. In addition, an assessment is made of the feasibility of including in the shortage area criteria predictors of the likelihood that unmet demand will be met within two years.

This report deals only with the designation criteria for shortages of primary care health manpower and, to a lesser extent, dental manpower. The report is limited to these for several reasons. First, the shortage criteria for these categories of health personnel are by far the most important ones from the standpoint of program needs and usage, particularly for purposes of National Health Service Corps placement.

Second, they are the categories that have received the most attention of the Congress, policy makers and others. Third, data are most readily available for the evaluation of the criteria for these categories; in the case of primary care physicians, several alternative approaches for identifying shortages were also available for comparison. Finally, although shortage area criteria have been defined and applied for optometrists, pharmacists, podiatrists and veterinarians, time and resource constraints did not permit the additional lengthy and detailed analysis and evaluation that would have been required to assess them appropriately. However, efforts are already underway within HRSA to locate and acquire relevant new data and to assess the criteria for these important health professions.

Following an executive summary of the report, the body of the report is organized into three major parts and seven component chapters. The first part of the report provides essential background information on the health manpower shortage area criteria and designation process. Chapter I reviews the role, evolution and present status of the current HMSA designation criteria and broadly describes the process used to identify shortage areas. Chapter II deals with the development and use of the HMSA criteria and describes some of the definitional, operational and administrative considerations that need to be taken into account in appropriately assessing the adequacy of the HMSA designation activities.

Part Two of the report, consisting of Chapters III through VI, presents the results of the detailed technical analyses undertaken to meet the specific requirements of the legislative mandate. Chapter III describes the findings of a comparison of the current HMSA criteria approach with several alternatives. Measures of the various concepts of shortage (i.e., shortages due to limited access, unmet need, unmet demand, or availability problems) are discussed and three alternative shortage or underservice indices are compared with the current HMSA approach. Each index is based on a different approach to measuring shortage and each has been mentioned as a possible alternative to the current HMSA approach. Chapter IV provides an assessment of the appropriateness of the application of the HMSA criteria by comparing the current designation status of counties against the most current information available for the major criteria to find out the degree to which counties are designated when they should not be, and conversely the degree to which they are not designated when they should be. It also describes the results from several case studies of sub-county health service areas in New York City, Los Angeles, and rural West Virginia. These case studies assess the appropriateness of the designation status of these areas when examined in the light of data currently available in specific local areas, and describe health manpower shortage issues, problems, and concerns as perceived by officials in these local areas, particularly as they relate to the HMSA criteria and process. Chapter V examines the appropriateness of the particular numerical values (i.e., cut-off levels) used in the current HMSA criteria. Their numerical values are compared with national data to determine their appropriateness, largely based on what percentage of the entire Nation falls within the threshold of the criteria.

In Chapter VI, the discussion centers around the issues and prospects for including in the HMSA criteria indicators of the likelihood that unmet demand will or will not be met in two years. This issue is categorized essentially into two questions: What indicators of unmet demand exist and are they available to use in criteria? And, is enough known about market response to unmet demand to permit a pragmatic, program assessment that unmet demand in a specific area will be met in two years?

Part III consists of the final chapter of the report (Chapter VII), which presents the major conclusions arising from the study and provides a series of recommendations, both for specific improvements in the HMSA criteria and for further research. At the end of the report are several appendices which contain detailed tables and other exhibits relevant to the analyses presented in the preceding seven chapters.

PART ONE

AN OVERVIEW OF
THE HEALTH MANPOWER SHORTAGE AREA PROGRAM

CHAPTER I

THE ROLE, EVOLUTION AND PRESENT STATUS OF HEALTH MANPOWER SHORTAGE AREA DESIGNATION CRITERIA

This chapter provides a brief overview of the role, evolution and present status of the health manpower shortage area (HMSA) designation criteria. It identifies the role of HMSA designation as a first step in programs for the improvement of health manpower distribution, reviews the history of shortage area designation, and outlines the process followed to designate areas using the HMSA criteria. It concludes with a more detailed explanation of the primary medical care manpower shortage criteria, the main focus of shortage area designation efforts and of this evaluation study.

Role of Shortage Area Designation

The designation of health manpower shortage areas functions as the first step in a multi-step process leading to placement of National Health Service Corps (NHSC) personnel. The full process includes a number of steps.

(1) An area, population group, or facility is designated as a HMSA, which makes it eligible to apply for possible assignment of NHSC personnel.

(2) A public or non-profit private entity which is located in the designated area or which has a "demonstrated interest" in the area applies for NHSC personnel assignment.

(3) The application for NHSC personnel is reviewed and approved at the Public Health Service (PHS) Regional office level. The regional office review process involves an examination of: (a) the need and demand for health manpower in the area; (b) community support for assignment of NHSC personnel; (c) local efforts to secure health manpower; (d) provisions for fiscal project management; and (e) intended use of Corps assignees from an appropriateness and efficiency standpoint. If the proposed site location is not within the designated area or if the proposed project is to serve a designated population group, the application must demonstrate that the site location is appropriate for serving the designated area or population. Comments of local health systems agencies and/or State health planning and development agencies as well as of local medical, osteopathic, dental, or other health professional societies representing practitioners in the designated area are required to be considered in the application review process.

(4) Approved applications are assigned priorities for placement by regional PHS officials. These priorities involve consideration of the degree-of-shortage determined in the earlier designation process, but may also take into account other factors, such as the extent of need or demand identified in the review of the

application process, the degree of community support, and the nature of the comments received from local planning agencies and professional societies.

(5) Individual NHSC scholarship holders and/or available volunteers are matched with the vacancies in those approved sites which have received high enough priority to be eligible to receive assignees. In making such assignments, efforts are made to match assignees with sites in such a way as to increase the probability that the NHSC assignee will remain in the designated area as a private practitioner after completing his or her period of obligated service and/or tour of duty.

As can be seen from the steps described above, HMSA designation acts only as an initial screen of areas to identify those which appear to meet general national criteria for shortages of health manpower. The full process must be followed in order for a community to obtain federally-salaried NHSC personnel. In the case of the NHSC Private Practice Option (PPO), the process does not involve as many steps, since individuals with service obligations who elect this option are essentially responsible for selecting their own designated shortage area in which to practice and for locating a position or practice site in that area. Nevertheless, the principle is the same--designation is the first step in the process with closer analysis of the need and demand for services in the designated area being carried out after that. The analysis could be done by an individual seeking to satisfy his/her obligated service who needs to determine whether a viable practice can be established in the area, or, in the case of a PPO individual seeking a salaried position in a HMSA, by a potential employer who needs to determine to what extent the salary to be paid can be supported by the use made of the practitioner and paid for by receipts. (Since a significant proportion of NHSC PPO employers thus far have been federally-funded clinics, the analysis of need and demand in many cases may be carried out by a Federal grantee.)

An earlier program for which shortage area designation was also the first step was the health professions student loan repayment program. While the authority for this program still remains, new applicants are not currently being funded, although some recipients are still serving in shortage areas under agreements initiated in prior years. This program operated in a fashion similar to the present PPO approach, in that the individual loan recipients were responsible for locating their own positions or setting up their own practices in designated areas.

In summary, then, the criteria and process of designation should be viewed and evaluated primarily in their role as a first screen for identifying areas with low availability of health manpower, indicators of unmet needs for health services, and/or possible problems of access to health care. Additional local need and demand analyses and examination of factors affecting viability of a practice or salaried employment for health professionals in the designated area are undertaken in subsequent parts of the overall Federal health manpower placement process.

History of Shortage Area Designation Programs

There have been four distinct periods in the history of health manpower shortage area designation, each characterized by different sets of criteria and different designation procedures. While the criteria and designation procedures were changed each time in response to changes in congressional mandates, the changes also reflected improvements stemming from research and analysis, and represent an evolutionary, incremental process of development.

The earliest health manpower shortage area designations were mandated by legislation in 1965 (P.L. 89-290, Health Professions Educational Assistance Amendments) creating Section 741(f) of the Public Health Service Act. This legislation provided for forgiveness or cancellation of portions of outstanding health professions student loans obtained by students in schools of medicine, osteopathy, dentistry, and optometry, in return for their service after graduation in areas found to have shortages of physicians, dentists, or optometrists.

The criteria promulgated to implement the loan cancellation programs provided for shortage area designation on the basis of specific ratios of practitioners to population applied to county data, with special consideration allowed for county or subcounty areas exhibiting inaccessibility of medical services to the residents of the area, advanced age or incapacity of practitioners, or particular local health problems. The practitioner-to-population ratios chosen as shortage levels for purposes of loan cancellation were 1:1,500 for physicians (counting all active MDs and DOs in patient care), 1:3,000 for dentists, and 1:15,000 for optometrists. Although these ratios were set by the Secretary, actual designation of areas was carried out, in accordance with the law, by the State health authorities.

The second period of the designation program history was inaugurated with legislation enacted in 1971 which modified the earlier law by providing that an individual must sign an agreement with the Secretary to serve in a shortage area before that individual could receive benefits for such service. The 1971 law (P.L. 92-157, Comprehensive Health Manpower Training Act) also allowed for repayment of educational loans other than those made by the Federal Government. The criteria used for this new loan repayment program were essentially the same as those previously used for loan cancellation, but shortage area designation was to be done by the Secretary instead of by the State health authorities. The 1971 legislation extended the loan repayment program to include podiatrists, pharmacists, and veterinarians. Simple population-to-practitioner ratios were also used to make shortage area determinations for these professions. The numerical values of the shortage ratios for the six disciplines included in the loan repayment program were chosen to be about 150 percent of the national mean population-to-active practitioner ratio for each discipline (except for physicians, where 200 percent of the national mean was used).

The first list of shortage areas designated under the amended Section 741(f) utilizing the above criteria were issued in July 1973. Most areas designated were whole counties, data being available only at the county level. The physician shortage area list included roughly two-thirds of all U.S. counties; the dentist shortage area list, about one-half.

A year later, under the Emergency Health Personnel Amendments of 1972 (P.L. 92-585), the Secretary was required to develop a list of "critical health manpower shortage areas" (CHMSAs) eligible for placement of National Health Service Corps personnel under Section 329(b) of the PHS Act. Because this program was to operate only in CHMSAs, more stringent criteria were selected than those used for the loan repayment program.

To indicate critical medical shortage areas, a primary care physician-to-population ratio of 1:4,000 was used, applied either to county data or, where available, to data on subcounty groups of census tracts or minor civil divisions. Also taken into account for subcounty areas were the availability of health centers within certain distances and whether the ratio of primary care physicians to population in the county as a whole was less than 1:3,000. Primary care physicians for these designations were defined as non-Federal physicians in general or family practice, general pediatrics, general internal medicine, obstetrics and gynecology, and, in nonmetropolitan areas, general surgery. To identify critical dental shortage areas, all dentists were counted and a dentist-to-population ratio of 1:5,000 was applied.

During this third period of the shortage area designation program's history, the Comprehensive Health Planning agencies were asked to review all areas proposed for designation and to provide additional data that could be used to evaluate and determine which areas should be designated.

The first list of CHMSAs was published in October 1974; revised lists were published in February 1975 and July 1976. The July 1976 publication included an expansion of the criteria to allow for consideration of mitigating circumstances that could be taken into account in evaluating requests for designation of areas that might not quite meet specific physician-and dentist-to-population ratio criteria. It also included information relative to definition of appropriate service areas against which to apply the criteria. When the Section 329(b) authority for these designations expired September 30, 1977, the list of critical medical manpower shortage areas and the list of critical dental manpower shortage areas each contained roughly one-fourth of all U.S. counties, and an additional 400 subcounty medical shortage areas and 100 subcounty dental shortage areas.

The fourth (and current) period of the program's history began with the passage of Public Law 94-484 (the Health Professions Educational Assistance Act of 1976), enacted October 12, 1976, under which a new section 332 was added to the Public Health Service Act, entitled "Designation of Health Manpower Shortage Areas." This section required that the Secretary establish, by regulation, new criteria for the designation of health manpower shortage areas. The Act also set down specific requirements for the criteria and for the process of designating shortage areas, which significantly augmented previously established procedures and increased the complexity of the criteria required.

As expressed in the House and Senate reports and in the specific wording of the Act, the major congressional objectives in enacting the new section 332 were the following: (1) To permit designation of urban areas as well as rural areas; (2) To "broaden the concept of shortage," by defining shortage less stringently and by "going beyond ratios alone"; and (3) To insure that "areas, population groups, and medical facilities with a more severe need for the assignment of Corps personnel be assigned personnel on a priority basis."[1/]

The statute specifically called attention to the fact that urban as well as rural areas were to be included as shortage areas, and stated that an area need not conform to the geographic boundaries of a political subdivision but should be a "rational" area for the delivery of health services. It required that the new criteria to be developed should include not only practitioner-to-population ratios but also indicators of a need for health services, with special consideration given to indicators of infant mortality, access to health services, and health status. Section 332 also required consideration of the recommendations of Health Systems Agencies, State Health Planning and Development Agencies and Governors in the process of designating areas, with emphasis on the recommendations of Health Systems Agencies. In addition, wording of the new statute permitted designation of population groups and facilities with health manpower shortages as well as geographic areas, thus opening the way for designation of certain population groups that may have difficulties in gaining access to health manpower within larger areas which, as a whole, may appear to have sufficient numbers of practitioners.

Finally, priorities were to be assigned to the designated areas. New section 333(c) of the Public Health Service Act required that the Secretary give priority to applications for placement of NHSC personnel in areas with the "greatest health manpower shortage," determined according to the criteria established under section 332. This provision required that the criteria identify those areas with the "greatest" health manpower shortage as distinct from other areas.

Criteria for designating Health Manpower Shortage Areas under Section 332 of the new P.L. 94-484 were published as interim-final regulations on January 10, 1978, and in final form on November 17, 1980. Separate criteria for each of seven types of health manpower were included. The seven types are as follows: (1) Primary medical care manpower shortage areas; (2) Dental manpower shortage areas ; (3) Psychiatric manpower shortage areas; (4) Vision care manpower shortage areas (i.e., areas with shortages of optometrists or ophthalmologists providing vision care services); (5) Foot care manpower shortage areas (i.e., areas with

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[1/] Health Manpower Act of 1975, Report by the Committee on Interstate and Foreign Commerce No. 94-266, U.S. House of Representatives, June 7, 1975.; Health Professions Educational Assistance Act of 1976, Report No. 94-887, U.S. Senate, May 14, 1976.

shortages of podiatrists and other practitioners providing foot care services); (6) Pharmacy manpower shortage areas; and (7) Veterinary manpower shortage areas. Thus, all major categories of manpower used by the NHSC or covered by the loan repayment program were included.[2]

Generally, three basic tests are applied in determining health manpower shortage areas: (a) the geographic area under consideration must be a rational service area for delivery of the type of care involved; (b) certain ratios or other types of criteria (or both) must be met by the area itself; and (c) manpower in contiguous areas providing the same type of care must be overutilized, excessively distant, or inaccessible to the population of the area under consideration. Service areas designated may include counties, groups of urban census tracts, or groups of rural county divisions. The criteria also provide for designation of population groups and facilities. (A copy of the criteria is included with this report as Appendix A).

The selection of the specific factors and values contained in the current criteria reflect a variety of considerations. In a number of instances, examination of the distribution of values observed in different areas was the primary basis for determining criteria values. In some cases, a definitive study had been carried out. Where no base data or definitive studies existed, the shortage criteria reflected program experience and professional judgement, as well as an intent to identify those areas with the most serious shortages. Frequently, "ideal" target ratios were modified so that manpower distribution program resources would be concentrated on areas with the most serious shortages.

As of the end of 1981, the Department of Health and Human Services had designated approximately 2,000 service areas--ranging from small communities and rural counties to urban inner-city neighborhoods--that had a shortage of primary medical care physicians, and over 900 areas that had a shortage of dentists. Most of the designated areas are nonmetropolitan--70 percent for primary medical care and 80 percent for dental care--and more than two-thirds of the areas had less than 20,000 population. As of the end of 1981, the National Health Service Corps had approximately 1455 physicians, 374 dentists, 20 psychiatrists, and 407 other health personnel providing services in designated areas.[3]

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[2] Designation of nursing shortage areas is accomplished under a separate legislative authority (Title VIII of the PHS Act).

[3] Although the NHSC is usually viewed as a Federal program, there is extensive involvement by local communities. The administration is moving further in this direction. An important demonstration project is currently under way to involve the States more closely in NHSC activities. Contracts have been awarded to 15 States to perform needs assessments (including evaluations of current and potential HMSAs), to participate in site development, to assist in the matching and placement of NHSC assignees, to become involved in the management of NHSC personnel and the sites in which they are located, and to conduct continuing professional education for NHSC personnel.

The Process of HMSA Designation

In determining the eligibility of areas for shortage area designation, the HMSA criteria are not applied unilaterally by program officials. Rather, considerable local input is sought and received at various stages in the process. The process is described below, as it has been in effect since the designation authority of PL-94-484 became effective in October 1977.

Following publication of Interim-Final regulations (in January 1978), a listing of all counties that appeared to meet the minimum population to physician ratio (based on 1978 county population estimates and 1976 AMA physician data), together with a list of subcounty areas designated under the previous critical health manpower shortage criteria, was compiled by the Bureau of Health Professions and distributed to the HSAs, SHPDAs, and State Governors for review, together with the criteria and relevant available data on the areas involved. Those counties and subcounty service areas that were identified through this review as also meeting the contiguous area requirements and other designation criteria were assigned to the appropriate degree of shortage group under the criteria and entered into a computerized Shortage Area Data Base (SADB). The first resulting list of HMSAs was published in the Federal Register in July, 1978.

Periodically, the BHPr compiles the latest national data on the numbers of health professionals, either from national health professional associations or from surveys, and obtains the latest census counts or estimates of the population. Unweighted and unadjusted population to practitioner ratios are then calculated for all counties in the U.S. This information is then submitted to the HSAs, SHPDAs, State Governors and professional organizations for review. After they suggest appropriate adjustments to the population count and weigh the practitioner count based on any additional information they may have, they are asked to make recommendations as to which areas appear eligible for either designation or dedesignation, based on the data provided or available in the local area. Final action on this broad periodic review requires approximately 120 days from inception to completion.

Individual requests for designation of HMSAs may be submitted at any time by any individual, community group, professional organization, Health Systems Agency, State Health Planning and Development Agency, State Governor, or any other local or state governmental agency concerned with health care planning or delivery. All such requests are supposed to contain information on the supply of health manpower available to serve the area's population, the availability of resources in contiguous areas, and the presence of any special needs of the population, using the measures specified in the criteria for shortage. Requests also should include a map showing the location of resources within the area and in contiguous areas. Data sources should be cited, and any adjustments to practitioner supply or area population figures explained. In addition, the rationale for the selection of a particular service area definition (in terms of travel times, composition of the population, etc.) should be provided, particularly for non-county service areas and for population groups.

Requests for dedesignation, i.e., withdrawal of a designation, must either: 1) identify changes in population or practitioner counts that indicate that the population to practitioner ratio has dropped below the minimum ratio required for designation, or 2) provide other information that, due to changed circumstances, the service area, population group or facility that has been designated no longer meets all of the criteria required for designation. As with designation requests, dedesignation requests may also be submitted at any time by any interested party.

Before any request is evaluated, however, the appropriate health systems agency, State health planning and development agency, and Governor is provided 30 days to comment on the request. In the case of primary care and dental requests, copies of the request are also sent to the appropriate State professional association for comment. Requests for psychiatric designations are sent to the appropriate State Mental Health Authority. In order to shorten the designation process, it is recommended to persons submitting a request that they solicit the assistance and/or endorsement of these interested parties, or at least provide them with a copy of the request simultaneously with its submission to the shortage area designation staff. If the information provided with a request is inadequate, the applicant is notified.

Once comments have been received or the comment period has expired, the request is evaluated to see whether the criteria for designation have been satisfied. Notification of final action on a designation request is sent to the applicant and to the appropriate health systems agency, State health planning and development agency, Governor, Public Health Service Regional Office, and others. Efforts are made by the HMSA staff to act on individual designation requests within 60 days.

A record of all designation activity (since 1978) is contained in the Shortage Area Data Base (SADB), a computerized file indicating the shortage status of all U.S. counties and designated subcounty areas. This file is updated at regular intervals to incorporate information obtained in the continuous process of reviewing areas for designation, dedesignation, update of designation and degree of shortage, as well as information obtained through periodic reviews and receipt of new statistics from professional associations and other statistical sources.

The Primary Medical Care Criteria

As indicated earlier, the principal focus of the present evaluation report is the criteria for primary care physicians. A more detailed explanation of these criteria thus may prove helpful to the reader in understanding later chapters of this report.

Initial determination of the population-to-primary care physician ratios in 1976 was based on 1974 data, the most recent data available at that time.[4] In 1974, the mean ratio for all U.S. counties was 2,360:1, while the ratio for the lowest median quartile of counties was 3,580:1. The value of 3,500:1 was chosen to indicate a shortage, because it represents a level approximately 50 percent worse than the median county level and picks out approximately the lowest quarter of the country on a county basis.

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[4] Although these ratios are still utilized in the criteria, examinations of new data as they became available indicated little rationale for changing them. This is discussed further in Chapter V.

A ratio of 3,000:1 was chosen as the value to which the shortage criterion may be reduced for areas where unusually high needs for primary medical care services are indicated. Indicators of unusually high needs for primary medical care services chosen for inclusion in the criteria were those mentioned in the legislation and others believed to be indicative of more general health problems. Data were available to include in the criteria the following indicators of unusually high need:

Infant Mortality Rate. The criterion of infant deaths per 1,000 live births was consistent with the standard proposed in the draft National Guidelines for Health Planning at the time.

Poverty Rate. The criterion of 20 percent of the population with incomes below the poverty level was consistent with the standards used to identify low-income neighborhoods defined by the U.S. Census Bureau (based on 1970 census data) in the 50 largest cities.

Fertility Rates. From data published in a special study of the National Center for Health Statistics, it was determined that the poverty areas (i.e., census tracts in which 20 percent or more of the population was below the poverty level in 1970) in approximately half of the major cities in the U.S. would meet a criterion of more than 100 births per 1,000 women aged 15-44.

Reduction to the lower level of 3,000:1 may also be made for areas which can demonstrate insufficient primary medical care service capacity. Indicators of insufficient capacity, based on a sample survey of office-based primary care physicians in small metropolitan areas funded by the Bureau of Health Professions, were chosen as follows:

Visits per Year per FTE Physician. Data from the survey showed that office-based primary care physicians in small metropolitan areas provided an average of about 6,400 office visits per year. The shortage criterion was set 25 percent above this average level, at 8,000 visits per year.

Appointment Waiting Times. According to data from the survey, waits for appointments for routine medical services exceeded 7 days for established patients or 14 days for new patients in 11 of the 100 largest SMSAs. These lengths of wait for appointments were judged unusually long.

Waiting Times at Primary Care Providers. According to the survey, office waiting times of 20 or 25 minutes were typical, while data from the American Medical Association showed waiting times for general practitioners averaged nearly 30 minutes. For the criterion, values of one hour where patients have appointments or two hours where a first-come, first-served basis applies were selected as representing time periods which are perceived as excessive.

Excessive Use of Emergency Room Facilities. This indicator was not translated into a quantitative criterion due to lack of data on which to base a selection.

Limited Acceptance of New Patients. According to the survey, in 10 percent of all areas surveyed, two-thirds or more of the primary care physicians were limiting their acceptance of new patients. This two-thirds or more was judged to be a substantial portion and was chosen as the criterion.

Low Utilization. The national average annual office visits per person to primary care physicians was 2.7 at the time. The criterion was set at 25 percent below the national average, at 2.0 visit per year per person, as indicative of abnormally low utilization of health services.

The primary medical care physician shortage area criteria also require that the physician supply in contiguous areas be taken into consideration when an area is considered for shortage area status. If primary care manpower in contiguous areas are excessively distant, overutilized or inaccessible to the population under consideration, then the applicant's area may be designatable. The following specific criteria were selected to identify contiguous area situation.

Excessive Distance. Based on several surveys, the excessive distance criterion was set at beyond 30-minute travel time. This criterion allows flexibility in translating into the actual distance involved, depending on road and terrain character, traffic, etc. It is also used in the definition of rational service areas.

Overutilization. The measure of overutilization selected was a population-to-physician ratio in the contiguous area is in excess of 2000:1. This ratio was chosen for consistency with the adequacy level proposed in draft National Health Planning Guidelines and used in departmental primary care physician requirements estimates.

Access barriers. The measure selected was significant demographic or socioeconomic differences between the populations of the areas. This measure, which can include neighborhoods isolated by language, cultural or racial barriers and is also used in the identification of rational services areas, was selected as one means of identifying specific potentially underserved population groups within large metropolitan areas.

Economic access barriers. Twenty percent of the population or the households of the area under consideration must have incomes below the poverty level, and Medicaid-covered or public primary care services must not available in the contiguous area. This measure was selected to allow designation of low-income neighborhoods where appropriate.

The criteria also include factors to determine which areas have the greatest degree of health manpower shortage for purposes of determining priorities for placement. In general, the priorities mainly reflect the level of the practitioner-to-population ratio and whether or not unusually high needs or insufficient capacity as defined in the criteria, are present.

Population Group Criteria

Although the major focus of the current criteria is on methods for identifying geographic areas with health manpower shortages, in accordance with the legislation, provisions are also included for identification of population groups with such shortages. These criteria generally require that access barriers (economic, linguistic, cultural, or architectural) be identified which prevent a particular group of the population from use of some or all of the area's primary care providers. For designation, the ratio of the number of persons in the population group to the number of primary care physicians serving the population group must be at least 3000:1. Most Indians and Alaska natives are automatically designated.

Facilities Criteria

Special criteria are included for designation of prisons with primary care manpower shortages. In addition, a general provision covers possible designation of other types of facilities if they meet two requirements: (a) the facility is providing primary medical care services to a designated area or population group; (b) the facility has insufficient capacity to meet the primary care needs of that area or population group.

CHAPTER II

DEVELOPMENT AND USE OF THE HMSA CRITERIA--DEFINITIONAL, OPERATIONAL AND ADMINISTRATIVE CONSIDERATIONS

The previous chapter discussed the congressional mandate for this study and the role, evolution and present status of the criteria and process used in identifying shortage areas. This chapter attempts to place into context a number of general designation issues and considerations as a basic framework for understanding the HMSA objectives, goals, and constraints.

The first part of the chapter provides a discussion of one of the most serious problems facing any attempt to identify shortages of health manpower--the many conflicting definitions and concepts of "shortage or "underservice." Since shortages of health manpower are really derived from broader kinds of shortages, this part discusses the different key concepts of "shortage" that are widely used. Although no single definition is set forth as being the "correct" one for identifying health manpower shortage areas here, choosing from among the many alternative concepts of shortage is clearly a major problem to be faced in selecting criteria for shortage area designation.

The second part of this chapter deals with the myriad of other issues, problems, and constraints--including data unavailability--which limit the program's ability to utilize more complicated theoretically-based approaches to identifying shortage areas. Although all such operational issues are not necessarily insurmountable, they nonetheless represent significant practical constraints on the identification of health manpower shortage areas. Taken together, the two parts of the chapter are intended to serve as a basic framework for the several technical assessments in the chapters that follow.

A Definitional Framework for Assessing Manpower "Shortage" Identification

Discussions and the extensive literature on shortage areas and the NHSC use many different concepts of shortage to define what are seen to be important goals of the programs. Such phrases as "providing care for unmet needs," "improving care access," and "alleviating personnel shortages" are widely used and generally agreed upon as being the goals of the programs. Clearly, a conclusion as to whether the health manpower shortage criteria as currently defined and applied result in the designation of areas which actually have shortages of health manpower depends upon the definition of "shortage." Thus, when it becomes necessary to identify specific shortage areas in terms of these concepts, a much more precise definition within a theoretical framework is needed, one that relates the definitional concepts to each other. The purpose of this section is to explain and define the key terms, as they relate both generally to the HMSA program and specifically to the goals of the NHSC and other manpower distribution programs, so as to provide a conceptual framework for the subsequent discussion of the practical aspects of implementing criteria which reflect these concepts and for the detailed evaluation of their impact.

The complexity of the interrelationships between the various concepts of shortage can perhaps be better understood by viewing them in diagramatic form as is presented in figure 1. Although the diagram may seem complex, it is actually abstracted significantly from the true complexity of the real health care system. "Clinical need" is represented by a block near the top of the diagram and is related to several other concepts, by interrelationships shown on the diagram. A patient's "health status" must first be clearly understood. "Biomedical knowledge" is related to clinically defined needs because one must not only know what constitutes good health but must also have a knowledge of what modern medicine can do to intervene in ill health. "Technology" is related to "clinical needs" because if there is no technically efficacious intervention for a disease condition then real need for medical services does not exist.

Since health status and clinically-defined needs are related but distinct concepts, this distinction will be maintained in the definitions that follow, with "clinical need" defined to be: medical services which expert medical opinion believes ought to be consumed over a period of time by a population in order for its members to maintain or become as healthy as is permitted by existing knowledge. 1/ The definition of "Unmet clinical need" follows directly from the definition of need and is defined as: the difference between the quantity of medical services which medical opinion believes is needed by a population over a period of time and the quantity of services which is actually consumed. Finally, "health status" is defined as: an individual's state of physical or mental well being.

The block below "clinically-defined needs" on the diagram is "perceived needs" which, in distinction to clinically-defined needs, is influenced by an individual's knowledge, education, and beliefs. "Perceived need" is also distinct from an individuals' "wants" (or desires). The difference between "wants", "clinical needs" and "perceived needs" reflect a combination of factors which includes: the gap between what the expert and the patient regard as standards for good health, the patient's wish to avoid pain, suffering or embarrassment, and uncertainty concerning the benefits of intervention. Thus, a person could have a clinically-defined need for medical services, perceive that he has a need for only some of those medical services, but because of his individual preferences and beliefs, not want any of them.

These distinctions are made explicit in the following definitions. Perceived Need is: that quantity of medical services an individual thinks is needed over a period of time based on his/her awareness of his health status. Wants is defined as: that quantity of services which a populations' members desire to consume over a relevant period of time based on their values, preferences, and perceptions of their health needs

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1/ Jeffers, James R. et al, "On Demand Versus Need for Medical Services and the Concept of Shortage, American Journal of Public Health, Vol. 61, No. 7, January, 1971.

providing they encounter no barriers to care. Unmet wants, therefore, is: the difference between that quantity of medical services the population desires to consume and that quantity which is actually consumed.

The next group of blocks on the diagram are "individual demand" for medical services, "individual utilization," and "market demand." Rooted in economic theory, demand for services arises out of consumers attempts to satisfy their wants when they are confronted with constraints on their utilization. Economists accept tastes and preferences as given and explore the marketplace for the consequences of consumer attitudes. Demand is explained by the price of the services demanded, the financial resources of the consumer, and the prices of other goods and services, as well as a consumer's wants.

The factors that influence the demand for services help to distinguish further between demand and want. Not all wants for a given service will manifest themselves in demand since the consumer has limited resources and must weigh relative wants for all goods and services before making decisions. Therefore, demand differs from wants based on the price of the service as well as the other financial constraints facing the consumer.

Although demand is frequently equated with services consumed or utilized, this report maintains an important distinction between the two concepts. Thus, "demand" is defined as: the quantity of medical services that would be bought by an individual or a population under various market conditions such as different prices and incomes. Utilization is defined as: that quantity of medical services ultimately consumed within a defined period of time. "Utilization" is one particular occurrence resulting from particular supply and demand conditions among the many that could have occurred had conditions been different.

The concept of "unmet demand" is more difficult to define since it is not a widely used economic concept. Central to the concept, as defined here, is the relationship between the utilization of medical services and the demand for medical services under different market conditions and time frames over which that relationship is considered. Three alternative definitions of unmet demand suggest themselves.

Whenever utilization is less than what a population is willing to consume (i.e. demands) under existing market conditions, the economic concept of excess demand is relevant. Thus, the first definition of unmet demand is identical to excess demand--the circumstance that exists when consumers desire to buy more health services than providers are willing to provide under existing market conditions. This concept refers to a set of forces that cause market adjustments to occur over a relatively short period of time. It does not usually indicate the actual change in utilization that has resulted after the adjustments are completed.

Alternatively, interest could focus on the actual change in utilization that would occur if particular market conditions were changed and initial (short-period) adjustments completed. For example, if the income of the population in question increased, the demand for medical services would increase if other factors remained constant. Or if the supply of medical services were increased, say by introducing additional physicians into an area, the utilization of medical services could increase. How much, if any, change in utilization would actually occur would depend on the responsiveness of demand (i.e., elasticity) to changes in price brought on by changes in supply. Thus, unmet demand can be defined as: the increase in utilization that would occur if market conditions (e.g. supply of services) changed and the market had adjusted initially. This type of unmet demand is particularly relevant to an assessment of whether or not a practitioner will ultimately be able to establish a private practice.

Finally, unmet demand could be developed on the idea of market adjustments occurring over a relatively long period of time. In this case unmet demand refers to the increase in utilization (brought on by an increase in demand, a decrease in supply, or both) that would occur after all market adjustments, both short term and long term, have been completed. Many of the same forces are at work in the first definition (i.e., excess demand) and in this definition. The distinguishing characteristic of the latter definition is that additional resources are attracted into an area to increase the productive capacity of the health care system. Thus, changes in prices, waiting times, etc., could indicate that either or both of these processes are occurring. The diffusion of health professionals is more indicative of the latter process.

The concept of "access" does not fit into a neat little box on the conceptual diagram because it does not arise from a theoretical framework, but from policy needs. Most program goals for delivery of health services, including those mentioned in relation to health manpower shortage area designations, refer to "reasonable access" to services as a right of all citizens. Problems arise in evaluating these programs because "access" is an elusive term. It has elements of demand in it as well as elements of supply.

Most definitions of "access" do not attempt to define it directly but in terms of factors used to measure the concept. These factors--reach, obtain, or afford--identify specific types of barriers to access to health services such as distance or topography, wait time for appointment, wait time in the office, acceptance by physicians as a new or a Medicaid patient, and the ability to pay. Other more subtle barriers such as attitudes towards, level of understanding about, and knowledge of health and health services are sometimes considered barriers affecting access. These latter obstacles are difficult to quantify and blur the distinction between access and the other concepts. For the purposes of this study, however, these latter barriers are excluded from the definition of "access," which is here specified to mean: the ability to reach, obtain, and afford services subsequent to the determination that such services are wanted or desired. Excluded factors are used elsewhere to define concepts like want and need.

Separation of "reach" and "afford" from "obtain" can be used to further clarify the definition of access. The concept of insufficient capacity requires the use of factors relating to obtaining medical services in a timely fashion. Thus, insufficient capacity is defined as: the ability of the care system to provide demanded services in a timely fashion.

"Availablity" and "supply" are concepts that relate to the blocks in the lower part of the causal diagram. "Availability" of services is defined as the presence of necessary inputs for the production of health services. These inputs include the total number of physicians in an area, the number of auxiliaries in an area, the number of nurses in an area, as well as the numbers of all other necessary health personnel in an area. It also includes the health facilities of an area such as hospitals, nursing homes, doctors' offices, and equipment. "Availability" is the program goal that is most directly affected by changes in health manpower and has been the focal point of health manpower designation criteria and the population to primary care physician ratio used as one of its criteria.

Manpower ratios have a number of recognized problems, however. For example, differences in yearly physician productivity (e.g., due to differences in the number of hours worked per year or differences in the efficiency with which auxiliaries are used) clearly influence the availability of health services. Thus, there is a real difference between the supply of services and the availability of inputs into the production of those services. Availability represents primarily a head count or census of resources, not a measure of the services actually forthcoming from a given set of resources. Recent changes in the health manpower shortage area designation criteria, have made considerable progress in introducing these productivity and other supply factors into the criteria. Nevertheless, this report maintains the difference between availability, access, and supply by defining supply as: the quantity of health services that will be produced by providers, both as individuals and in groups, given market conditions. (For a summary of the definitions presented in this section, see Appendix B).

The Operational and Administrative Framework Underlying the HMSA Criteria

Another aspect of the framework needed for understanding the current HMSA criteria and the specific analyses, conclusions, and recommendations that follow later, is the operational and administrative considerations which underlie formulation of the HMSA criteria and their application. This section provides an overview of the most significant of these considerations.

Ambiguous HMSA Mandates. As pointed out earlier, a conclusion as to whether the HMSA criteria as currently defined and applied result in the designation of areas which actually have shortages of health manpower depends crucially upon the choice of the definition to be used in identifying such shortages. In turn, the definition selected and the corresponding criteria for correctly defining and identifying that particular "shortage" of health manpower must relate closely to the goals of and the legislative mandates for the NHSC and the other Public Health Service programs that are aimed at addressing the maldistribution of health manpower.

At the inception of the NHSC, the congressional intent seemed to be to place physicians, dentists, and other health professionals in areas of the country that had few, if any, health professionals available and that were unable (and unlikely) to obtain them because of the areas' unattractiveness. That unattractiveness was largely viewed as being associated with an area's rurality--those isolated areas where health professionals would not have adequate peer support or associated essential services; where the usually-sought amenities of metropolitan areas could not be found; or, where the physician's or dentist's income expectations could not be met. This translated essentially into problems of availability.

The later emphasis on manpower problems in inner-city areas affected by urban blight, socio-demographic and racial separateness, poverty, and lack of education meant that there was a need for the criteria to identify shortages in inner-city areas so that the NHSC could serve them. Thus, access to health manpower, in addition to their availability, had to be addressed by the HMSA criteria and the NHSC program.

The Health Professions Educational Assistance Act of 1976 further broadened the goals of HMSA identification and of the NHSC and other HMSA-related programs by explicitly defining some of the factors to be taken into account in establishing the HMSA criteria. The factors mentioned included: (1) The ratio of available health manpower to the number of individuals in the area, population group, or facility under consideration for designation; (2) Indicators of a need for health services, notwithstanding the supply of health manpower; (3) Infant mortality rates; (4) Indicators of access to health services; and (5) Indicators of health status. In that legislation, the manpower/population ratio was listed first, but, other than that, there was nothing to indicate that one factor was to be considered more important than the others in designating shortage areas.

Because the primary measure used to determine health manpower shortage areas had historically been the population-to-practitioner ratio and because that ratio remained the first indicator mentioned in the 1976 legislation, an administrative and technical judgment was made to continue to emphasize the manpower/population ratio, but also to develop the criteria in such a way as to include the other indicators enumerated in the legislation, broadening the concept of shortage and making it less dependent on the practitioner-to-population ratio.

This broadening of the objectives of the HMSA criteria (and of the NHSC program) means that no single objective stands out as the primary and/or sole purpose of the criteria. This also means that the performance of the current criteria must be viewed in light of the various, somewhat different objectives.

Differing NHSC Program Goals. The apparently different objectives for HMSA designation and the variety of conceptual definitions of shortage obviously pose problems for development of universally acceptable criteria for identification of shortage areas. Compounding the problem is the fact that the NHSC also has various operational program goals which it must attempt to meet simultaneously. These goals sometimes appear to conflict, thus posing further problems for HMSA criteria development and structure. A few of these are mentioned below.

(1) Assignment of NHSC personnel to areas of greatest shortage vs. matching of NHSC staff for retention. While the NHSC is supposed to give priority to projects which would result in assignment of their members to areas with the greatest shortages,[1] it is also supposed to seek to assign to an area NHSC personnel whose characteristics (along with those of their spouse, if any) will match the area's characteristics in such a way as to increase the probability of their remaining to serve the shortage area upon completion of their obligated service and/or assignment period.[2] Thus, the desire of a particular NHSC individual to perform services in a particular shortage area must be taken into account. Since some of the areas with the greatest shortages can be expected to be those areas that are particularly unattractive, there is a conflict here which is often difficult to resolve.

(2) Service regardless of ability-to-pay vs. retention/Private Practice Option (PPO). Another requirement is that the NHSC must assign their personnel to HMSAs without regard to the ability of the local individuals, population groups, or facilities to pay for such services.[3] However, if a significant number of individuals in the designated area or population group are unable to pay for services, this clearly impairs the ability of formerly federally-salaried NHSC practitioners to remain in the area after completion of assignments to build a private practice. Similarly, another NHSC program goal is to increase the number of scholarship-obligated personnel who can serve their obligations through the PPO (i.e., receiving no Federal salary); in fact, this option has proved to be attractive to many individuals with scholarship obligations. Yet, the requirement to serve those unable to pay makes it more difficult for NHSC assignees electing the PPO to develop a viable private practice.[4]

(3) Health professional society comments. Another requirement is that the NHSC, in assigning personnel, take into consideration the comments of medical, osteopathic, dental or other health professional societies representing professionals serving the area or population and/or the comments of local physicians, dentists, and other health professionals with an interest in the area.[5] Comments of these associations and individuals are

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[1] Section 333(c)(1) of the Public Health Service (PHS) Act, as amended by P.L. 94-484.

[2] Section 333(f) of the Act, as amended.

[3] Section 333(e) of the Act, as amended.

[4] The Omnibus Reconciliation Act of 1981 eased these conflicts slightly by explicitly stating that NHSC scholarship obligors who elected the private practice option could be assigned to any health manpower shortage area, not only those with the greatest shortages.

[5] Section 333(c)(3)

also taken into account in the HMSA designation process itself.[6] Although the comments are often very useful, since the local health professionals and their societies are most likely to know the location, practice hours, etc. of local health professionals as well as the need and demand for health services in the particular area, the goals of the criteria (and of the NHSC) sometimes appear to be in conflict with what some local societies see as their own best interests. This means that the criteria must be flexible enough to allow for the legitimate interests and views of these interested parties along with those of the local areas and community groups requesting designation. The issue in large part reflects the access/availability and demand/need differences described earlier. The problem is less severe in isolated rural areas, where the significant operating part of the criteria is a low provider-to-population ratio (availability), than it is in urban areas and the more populated, less isolated rural areas, where the designation often relates more to access problems (particularly economic access) than to overall availability.

(4) Cost-effectiveness: Demand vs need. Another constraint on the effectiveness of the HMSA criteria is the NHSC program mandate to assign NHSC personnel in a cost-effective way and to have appropriate utilization rates at each Corps site. This suggests that HMSA designations should be of areas in which there is a high demand for care. However, the legislative authorities for both HMSA designation and NHSC placement put high emphasis on serving areas with both health service needs and with the "greatest" health manpower shortage, which means heavy dependence on the primary variables used in the criteria--the population-to-practitioner ratio. The "highest need" areas, such as those that might have high infant mortality and poverty rates, and those to which NHSC assignment preferences are given, do not also have high demand. This sometimes mitigates against high NHSC utilization or cost-effective placement, and as well as against use of simple, single-objective HMSA criteria.

General Principles for the Development and Use of the HMSA Criteria. The current criteria and processes for HMSA designation have represented an attempt to develop and to maintain a system that would be operationally and administratively feasible and would not call for excessive recources. In developing the initial health manpower shortage area designation criteria and procedures, a number of basic principles were identified and taken into account that still appear to be relevant. A listing of these may assist the reader in evaluating both the current criteria and other possible criteria. These are the following:

1) The criteria and process should meet the specifically-stated intent, goals and objectives of the legislation.

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[6] Section 332(e)(2)

2) The approach used should be objective, verifiable, and replicable.

3) The criteria and the process of their application should be simple, understandable, and generally acceptable for their many purposes.

4) The indicators required by the criteria shoudl be as generally available and relatively current as possible. In particular, the basic data sets required to identify shortages should be available nationally on at least a county basis for all areas in the United States.

5) The basic criteria and designation process used should be applicable, as far as possible, to all types of areas, whether whole counties, rural communities, or inner cities.

6) The designation criteria and process should be equitable and clearly reflect an even-handed application to all areas.

Data Considerations. Although it has not been possible to adhere completely to all of the above principles, the problems and concerns about data require special mention. In general, the most critical problem in the designation of shortage areas was and remains the unavailability of the data needed to examine and compare areas. This lack of data severely limits both the choice of criteria to be used in designating shortage areas and the accuracy of shortage area designation decisions. The information available simply does not permit the depth of analysis of local conditions on the uniform basis and nationwide scale that would be desirable. The shortage area designation staff must rely on data collected for other purposes by government agencies or by private sector organizations and which are available to the public or can be purchased. Those data that are available on a nationwide basis do not extend below the county geographic unit in level of detail. Thus, while not necessarily consistent with typical concepts of market areas and often not applicable to the delivery of primary health care, the county generally is the smallest unit of analysis that generally can be considered for measurement of variables for inclusion in shortage area criteria (although it is possible to obtain some very limited data for census tracts and minor civil divisions in urban areas).

An additional drawback is that many of the data available for use in designating shortage areas even at the county level are out of date when they are finally available for use. For example, the counts of population made in the decennial census are typically not available until two or more years after the census is taken. Although the Bureau of the Census does develop estimates on an annual basis of the total county population, these updates are made on the basis of trend projections rather than actual knowlege of changes in population in local areas. Thus, available gross population data may be misleading measures of the actual population of areas which have experienced changes in the direction of growth from historical periods, even though they are the best and latest estimates available. Even more importantly, essentially no information on population by age and sex, income level, or other characteristics is available between censuses. Sub-county data from the decennial census could be an important input to the development and use of shortage area criteria, but detailed local area data are usually three or four years old when they are released.

Data on health manpower also pose problems. Statistics on the number of primary care physicians, dentists, or other health professonals on an annual county-level basis are available from such organizations as the American Medical Association (AMA), the American Osteopathic Association (AOA), and the American Dental Association (ADA) and from various surveys. However such information on the basic numbers of health manpower are often several years old when first made available, because many professional associations and Government agencies survey the professions only infrequently. For example, the most recent detailed national physician data currently available are for 1979. Since the number of practitioners in many areas are regularly changing, 2-3 year old data cannot be used with any real confidence. In addition, detailed information on practice characteristics (hours, visits, etc.) of practitioners by local area, as well as by county, are almost non-existent.

The geographic level at which data are available (e.g., county, subcounty, multicounty, census tract, civil division, zip code) presents unquestionably the greatest single data problem. Little current data of any kind--whether on population, health manpower, poverty, infant mortality, or morbidity--are available on a local area basis. Where they are available on a local area basis, the data for these few areas are seldom consistent or compatible.

Generally, the constraints imposed on the designation program by the types and sources of data available to it mean that program officials at the Federal level are not able to gain a clearly resolved and up-to-date view of conditions at the local level consistently across the country.

Administrative Burden on Applicants and Reviewers. Lack of general availability and currency of data and the specific legislative requirements for review of designation requests by various agencies and interested parties make the designation process largely a case-by-case review process. This has a number of implications in terms of administrative and operational burdens on applicants, reviewers, and HMSA staff, and bears heavily on any evaluation of the criteria used or recommended for use. Some of the procedural/operational considerations that are essential to the effectiveness of criteria for the designation of HMSAs are:

(1) Applicants and local area reviewers need to be able to clearly understand the designation criteria and process.

(2) Applicants need to be able to obtain and provide the data called for by the criteria without an excessive investment of time and money. As indicated earlier, this is generally a difficult task even for use of the relatively simple HMSA criteria.

(3) The HMSA staff conducting the review of designation requests must maintain close contact with a wide variety of interested parties

and participants in the process. These include local applicants, local health planning agencies, State health planning and development agencies, State Governors, other State agencies involved (such as the State dental directors and State mental health authorities), medical and dental associations, and Public Health Service (PHS) regional office program personnel involved with developing projects and placing NHSC personnel. Technical assistance and explanatory materials need to be simple, explainable, and widely available,.

(4) Reviewing agencies and interested parties must be provided with a reasonable opportunity and length of time to review materials submitted by the original applicant and to comment on them.

(5) The HMSA designation staff must be able to evaluate objectively the material and data submitted by local applicants for consistency, adherence to the national criteria, and adequate empirical support, and must have the information required to evaluate what the actual local situation is, particularly when conflicting information is provided by the many interested parties. Anecdotal information and personal opinions and judgments cannot be the basis for an equitable, defensible national program.

(6) The number of interested parties and the intensive consultation needed to explain shortage area designation criteria and processes require those that are simple and understandable, so that individual cases are negotiable by the various parties concerned. Once a decision is made or questions raised on data and their interpretation, all interested parties need to be informed and provided with explanations as to why an area has or has not been designated.

(7) At least annually, a listing of all areas currently designated should be generated and published in the Federal Register. Summary statistics on designated areas should also be available to be compiled periodically, and estimates of the number of practitioners needed in designated areas provided on a regular basis by the shortage staff to the PHS regional offices, the NHSC and others for use in placing health professionals in the shortage areas. Criteria-related data that are capable of being updated regularly and periodically must be employed.

Staff Size and Capability Considerations. Administering a procedure of case-by-case review of the multitude of areas recommended for designation, covering all States, DHHS regions, and thousands of individual areas, requires a sizable, knowledgable staff to do the job adequately and accurately. During calendar year 1981, for example, a total of 955 individual designation or dedesignation requests were processed by the HMSA program staff, of which 597 were reevaluations of already designated health manpower shortage areas. This resulted in 206 continued designations with a change in the degree of shortage, 24 continued designations with a redefinition of area boundaries, 227 continuations with no change, and 140 withdrawals. Meanwhile, there were 358 requests for new designations, of which 299 were approved and 59 were rejected. Each request requires considerable staff analysis of a statistical, demographic and geographic nature, and significant interaction with local groups. The overall designation process entails review of requests, coordination with interested parties, update of the data base, management of the designation files, and reporting on designation results, among other things. The effectiveness of the HMSA criteria thus must be viewed in the context of the wide variety of tasks needed to carry out the program.

Local area responsibilities must also be considered. Designation data and procedures must draw heavily on the knowledge, expertise, and assistance of local and State agencies and organizations. These entities are well-placed to assess the relative health service and manpower needs of areas being considered for designation, to develop or obtain the most current data, and to assist in other designation-related efforts. In the past, through workshops held in the ten DHHS regions and through other mechanisms, considerable information and technical assistance has been provided to local entities so that they could be better equipped to assist in the HMSA designation process. At this time, responsibility for review of designation requests in many areas is shifting from local to State government. If appropriate review of HMSA designation requests is to continue as envisioned under the existing legislation, new or more complicated criteria would make the job even more difficult and probably would require a significantly expanded program of technical assistance.

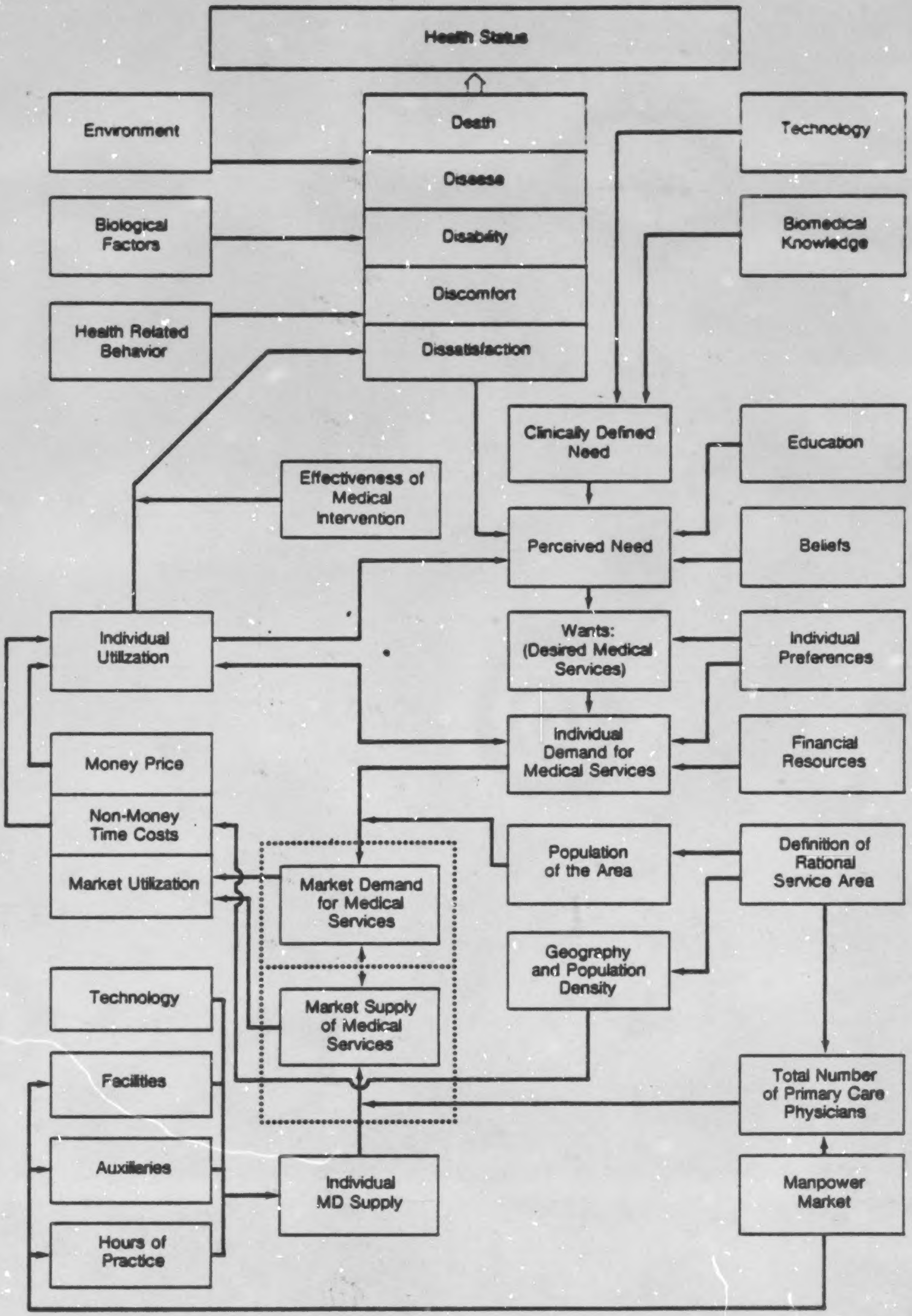
Summary. The term "shortage" has a number of connotations and is used to describe a number of conditions which the NHSC placement program is mandated to deal with. It has been variously used to refer to excess demand, unmet need, unequal geographic distribution, poor health of a population, excess demand, etc. When faced with the problem of quantifying a single concept of manpower shortage for use as a numerical criterion, program officials have chosen from among the alternative and often conflicting definitions of the term the one which, in their judgment, most reasonably corresponds to the intent of Congress and which can be realistically implemented to fulfill their mandated responsibilities within the resources available to do the job. While resolving ambiguity by eliminating some competing definitions from consideration, such decisions have inevitably resulted in some criticism of the concepts and criteria selected.

Some significant criteria-related decisions involve choosing a specific number to quantify a concept. In the case of the health manpower shortage criteria, a specific practitioner-to-population ratio was selected as the cut-off level which would demarcate the dividing line between a shortage of health manpower and an acceptable level of health manpower. Such a choice ultimately represents a less-than-perfect compromise based on statistical, analytical, and operational considerations.

The necessity for compromising among differing objectives in implementing the mandate and for quantifying concepts that many times have no empirical counterparts has left HMSA program officials with latitude for exercising judgment in developing the shortage area criteria. Some such decisions may have appeared difficult to justify, on purely scientific grounds. Consequently, the program has given a high priority to research on the problems of quantifying shortage area criteria and to improving administrative approaches to shortage area designation.

Nevertheless, there remain unsolved problems in the administration of the program. The current evaluation reflects that fact, as do the criticisms and suggestions for improvement that have been made by some public officials and members of the public at large. The chapters that follow deal with a number of those suggestions in an attempt to analyze them within the objectives, administrative environment and resource availability constraints of the designation program, and explore on a systematic basis whether alternative criteria would lead to substantive and significant improvements in the performance of the designation process.

Figure 1. Causal Diagram



PART TWO

THE TECHNICAL EVALUATION

Chapter III

COMPARISON OF HMSA WITH ALTERNATIVE MEASURES

The two explicit requirements of the congressional directive to evaluate the current HMSA criteria are (1) to determine if use of the criteria has resulted in the designation of areas that do not have a shortage of health professions personnel, and (2) to consider alternative criteria that may be used to designate manpower shortage areas. This chapter addresses both requirements.

As discussed in the preceding chapters, whether or not a particular set of criteria may be said to identify actual shortage areas depends in large part upon the definition of shortage used. Shortage has been defined in terms of various related concepts--availability, accessibility, unmet need, unmet demand, etc. This chapter compares the HMSA criteria and alternative criteria with indicators representing alternative shortage concepts and with each other, in an effort to determine (1) what type or types of shortage are being measured by the various alternative indices of shortage and/or underservice, and (2) what similarities and differences exist among the areas identified by the various alternative criteria or indices which have been used or proposed. Before any comparisons can be made, however, realistic and measurable standards by which each alternative will be judged must be made explicit. In the opening sections of this chapter, the standards to be used to make comparisons among the alternatives are discussed together with the measurement issues and data availability problems. The various alternatives to be compared are then described. For this evaluation, the HMSA criteria will be compared to four alternative indices (the Index of Medical Underservice, the Utilization Deficit Index, the Deaths Averted Index, and the Use/Need Index) as well as to different measures of the various shortage concepts discussed earlier.

Several types of comparisons are made between the HMSA criteria and the suggested alternatives. First, all of the alternatives are compared as to their similarity in ranking areas. If their rankings of areas are in substantial agreement, then it can be concluded that they screen similar characteristics. Second, the various alternatives are compared, two at a time, on the number and percent of areas that 1) both alternatives would designate, 2) only one would designate, and 3) neither would designate. Finally, the characteristics of the areas for which the alternative criteria agree and disagree with the HMSA criteria are analyzed. The major findings and conclusions that result from these comparisons are presented in the final section of this chapter.

Standards for Comparison

As indicated earlier, shortage criteria are "screening" devices. They screen areas using empirical measures of shortage. From the myriad of characteristics that could possibly be used to describe each geographic area, they select a few and classify areas into designatable or non-designatable categories on the basis of those chosen. If the criteria select the characteristics appropriate for meeting the program goals and are able to discriminate between areas on the basis of those characteristics, then they are good screens.

Three different levels of discrimination are possible with screens. The coarsest screen may simply identify the presence or absence of a characteristic. For shortage area designation this dichotomy is usually not sufficient. (For example, the complete absence of unmet need in an area is not likely to be observed, and the mere presence of it is not enough information to warrant designation.) At the next level of discrimination, a screening device is able to distinguish relative amounts of a characteristic among areas. For shortage criteria, this level allows one to rank areas from highest to lowest on some measure of shortage, and thus provides the minimum level of information needed for designation. At the highest possible level of discrimination, the screen would be capable of detecting the actual quantity of shortage in an area. The higher the level of discrimination, the more difficult the screening task becomes and the more data are needed to perform it.

To be effective, the designation criteria should be able to distinguish correctly the relative amount of the type of shortage of interest. If the criteria are able to generate a perfect ordering of areas on the characteristic of interest (i.e., make no mistakes in the rankings), they would be a perfect screen. All that would be left would be to decide what proportion of areas to designate. If, for example, it was decided to designate 10 percent of all areas, then it would be assured that those designated would be the 10 percent with the worst shortage.

Unfortunately, perfect screens are difficult or impossible to develop. The consequences of imperfect screens are imperfect orderings (i.e., mistakes in ranking the areas). Clearly, however, the degree of the mistake also makes a difference. It is better to indicate that an area ranks in the upper 10 percent when it really ranks in the upper 12 percent, than it is to indicate that it is in the upper 10 percent when it really is in the lower 10 percent. The first mistake would include areas with rather similar rankings; the second would include very dissimilar areas in the designated group of areas.

An additional complication arises when more than one kind of shortage is addressed with the designation criteria. Since areas may exhibit different amounts of the various types of shortages, they are likely to be ranked differently with regard to each shortage. There are several options for dealing with this problem when developing designation criteria. The easiest solution is to choose only one objective or goal for the program and concentrate on identifying areas which rank high in terms of that characteristic. For example, areas could be designated solely on the basis of availability of health manpower, ignoring unmet need or unmet demand. This option is not acceptable, however, because the policy goals for health manpower distribution are simply not singular. There is, quite legitimately, more than one goal to address.

Fortunately, more acceptable approaches are available for developing designation criteria which address multiple goals. First, and simplest, each goal can be dealt with in succession--one at a time. One group of areas could be designated on the basis of unmet need, a second group on the basis of unmet demand, and a third group on the basis of availability of manpower. This approach has the advantage of not confounding the goals; each criterion would be clear in its intent and its structure.

A second method is to establish priorities. One goal is chosen as paramount which must be satisfied first. For example, it may be decided that areas must have an availability problem before they can be designated. After those areas with an availability problem have been identified, they may then be ranked (or adjusted in some way) on the basis of other goals, such as unmet need or unmet demand. The current HMSA designation criteria use a variant of this approach.

A third alternative for dealing with multiple goals through ranking criteria is to consider them simultaneously and yet make a single assessment of an area. This method requires that the separate variables representing different goals be weighted and combined together into one index. The disadvantage of this approach is that potentially important information could be lost because the single index value for an area that results from such a weighting scheme will obscure information about the individual characteristics of the area. Furthermore, the index value for assessment of an area with a high score on one goal, say availability, but a low score on another goal, say unmet demand, could well be similar to the index value for an area which shows only medium scores on both goals. Despite the similarity of the overall scores, the two areas are actually very different in their health system characteristics.

Some of the measures of access to care, unmet demand and other concepts that are defined within the present study can be viewed as measuring a single goal (or group of related goals) at one time. The different indices that are compared later in this chapter each use one of the three methods just described to deal with multiple goals. For example, the current HMSA designation criteria establishes a priority system, while the current Index of Medical Underservice uses a weighting scheme.

The standard by which this evaluation will compare HMSA criteria with the alternative criteria is this: The most effective set of criteria is the one that ranks (screens) areas best for the characteristics of interest, and the more perfect the ranking, the better the criteria.

Desirable Properties of Measures

For practical purposes, a measure of a shortage must be empirically observable. It should also be reliable and valid. Reliability in a measure means that it is precise (i.e., the results of repeated measurement of the same unit of observation will vary minimally). Compared with reliability, validity is a more elusive concept. Several different types of validity have been defined, but central to all of them is the idea that a valid measure captures the essential characteristics of the concept it is measuring. [1]

All the types of validity are relevant to this study. The problem of selecting a valid measure of the concept of health status exemplifies their joint importance. Because health status is a multifaceted concept, no one indicator is sufficient to capture its complexity. For example, using infant mortality alone as a measure of health status would neglect the mortality status of the rest of the population and other aspects of the health status of infants. By using several different measures for the different sub-groups in a population, the full range of the concept could be captured and "content" validity established.

To continue the example, some measures used to indicate health status may be highly correlated. One would expect infant mortality, for example, to be highly correlated with some other measures of preventable mortality. However, it may not be highly correlated with disability among the aged. It is then said to be "convergent" with preventable mortality, but it "discriminates" an aspect of health status that disability does not address. A variable which is correlated with an unobserved variable may be used in its place in some analysis. For example, the percent of a population below poverty is often used as an indicator of health status although it is not directly related to the concept. It is used because it has been found to be highly correlated with variables (e.g., infant mortality) that are viewed as superior indicators of health status.

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[1] Construct validity involves specifying the underlying concepts which account for variance in the proposed measures as well as the hypothesized relations among those concepts. Two varieties of "construct" validity can occur. If different measures are logically related and highly correlated, then convergent validity has been achieved; if two logically different measures are not highly correlated , then discriminant validity is evident. Content validity involves whether a particular measure adequately represents the domain of content (i.e. the full range of things it applies to) of the concept that it is supposed to measure. In other words, does it measure all aspects of the concept in question? Criterion validity is the correspondence between a proposed measure and another measure whose validity is well established. This type validity criterion can be very useful when the measure of choice is not available. If its criterion validity can be established, the more widely available measure can be substituted. Ultimate acceptance of a measure's validity is based on consensual validity, that is, on the degree of consensus among investigators that a measure actually measures a certain quality.

All of the forms of validity important to this study depend on the emergence of a consensus regarding an appropriate measurement of a concept. This consensus has yet to emerge for "health status" and probably must await more precise definition of the concept. In its absence, researchers must rely on ambiguous measures.

The measurement issues exemplified by "health status" also apply in varying degrees to the other concepts previously defined. The choice of measures used in this evaluation will be based on consensus where possible. Multiple measures will be used to capture the complexity of the concepts where multiple measures are available. In addition, sociodemographic variables that clearly do not directly measure the concept will be used if "criterion" validity can be supported.

Empirical Measures for Alternative Definitions of Shortage

While it may be possible to think of perfect measures for identifying different types of shortage (i.e., ones with the desired reliability and validity), actual measurement is severely limited by data contraints. Under those circumstances, less than ideal measures had to be utilized in the analysis when better alternatives did not exist.

In the following discussion, those indicators that best measure each of the shortage concepts discussed in Chapter II will be identified first. Then, those measures that are practical to construct are identified. For those concepts that can not be measured at all, the reasons will be given. For those that cannot be measured ideally due to data constraints, the best alternative indicator will be chosen. For those that measure more than one concept, the reasons for preferring one concept over another will also be discussed. (A detailed listing of the measures used to identify the alternative types of shortage is presented in Appendix C.)

According to the definitions that are used for this evaluation, clinical need, and consequently unmet clinical need, require expert professional judgment to interpret the health status of individuals in terms of the physician visits that presumably should be consumed. Thus, conceptually and with ideal measures, clinical need and health status would be distinguishable, but with the data generally available, little can be done to discriminate between health status, clinical need, and unmet clinical need.

Researchers usually choose to measure health status with departures from health, such as death, disability, disease, discomfort, or dissatisfaction. This study follows previous research and uses these types of measures. To measure "health status" and "clinical need," three measures are used: infant mortality, age-specific mortality for three age groups and crude death rate (i.e., per capita deaths). These are available at the both county and primary sampling unit (PSU) level. (Primary sampling units are generally groups of contiguous counites; see following sections.) For "perceived need," 1974 NCHS Health Interview Survey data on an individual's perception of his/her health status, self-reported activity limitation and restricted activity days, as collected in approximately 470 counties, were selected.

The best measures of primary care utilization are primary care office visits (standardized for the medical care content), medical services, and expenditures. Self-reported physician visits, observed for 470 counties, is the best available alternative. Charges for routine office visits, percent Medicaid patients seen by physicians in practice, percent patients with private insurance, percent Medicare patients in physician practice and wait times are indirect measures of demand because they measure the circumstances that affect demand. These data are available for 250 PSUs. No good measure of utilization or demand is available for all counties. Outpatient and emergency room visits to hospitals are used, but it should be remembered that these measure insufficient capacity as well as utilization.

Insufficient capacity and excess demand are distinct but related concepts. The ideal measure of both would be some indicator of a consumer's inability to obtain in a timely fashion the services that are sought. Changes over time in the measures of utilization/demand are used here as measures of excess demand. The usual indicator of the presence of excess demand is the rate of change in price. Therefore, the change in office charges will be included as a measure of excess demand. Changes in waiting times for an appointment are thought to be good measures of both excess demand and insufficient capacity, and are available to this study. Similar reasoning applies to changes in acceptance by physicians of new, Medicare, and Medicaid patients, but these variables may also measure confounding influences due to administration of the programs.

Visits to the emergency room (ER) and/or outpatient departments (OPDs) of hospitals are frequently mentioned as measures of insufficient capacity. They are less relevant to excess demand than the change variables mentioned above; however, they are available for all counties while the change variables are only available for 250 PSUs.

The aspect of "access" defined as reachability is measured by travel time to obtain medical care. This information is available for 250 PSUs. Another indicator of "reachability," percent of county population in urban areas, will be used as an indicator of ability to reach medical services. This is primarily a sociodemographic factor, but has frequently been mentioned as an indicator of reachability.

Several measures of affordability are incorporated into this study. The percentage of a physician's patients receiving discounts, percentage of physicians giving discounts, and percentage of MDs accepting Medicaid and Medicare patients will be tried as indicators of consumer affordability. They are available for the 250 PSUs.

A measure of primary care physician supply population/full-time-equivalent (POP/FTE) as used in the HMSA criteria is considered an indicator of the availability of physician services. For counties that had applied for designation as a shortage county, this ratio has been adjusted for the age/sex composition of the population and the productivity of physicians. The unadjusted population to physician ratio is also available for all counties. Measures of productivity such as patients seen per hour and per week are available for 250 PSUs.

Sociodemographic measures have been mentioned during the previous discussion because they are associated with measures of shortage (i.e., they have criterion validity). For example, per capita income, percent of population below the poverty level and per capita AFDC payments are available at the county level and can also serve as measures of affordability (albeit less than ideal). However, in the analysis sociodemographic measures are treated as a separate group of measures. Their relationship to other measures are mentioned where appropriate.

Three Alternative Indices Chosen for Comparison

This section describes the three alternatives to the HMSA criteria that have been promoted in the literature, were available for study, and have therefore been used for comparison in this report.

Index of Medical Underservice. The Index of Medical Underservice (IMU) is the first existing index to be compared with the current health manpower shortage area designation criteria.[2] The IMU was developed by the University of Wisconsin Health Services Research Group and has been used by the Health Services Administration to designate Medically Underserved Areas (MUAs). Projects serving designated MUAs are eligible for grant funds under the Community Health Centers, Urban and Rural Health Initiative programs.

As its name implies, the IMU is intended to measure medical underservice allowing comparison between areas. A mathematical model which predicts experts' assessments of the relative scarcity of personal health services in an area is used to actually calculate IMU scores. Two assumptions which underlie this approach were tested and validated by the University of Wisconsin group in the process of developing this model: (1) That experts from different disciplines and geographic areas tend to agree in their assessments of the relative scarcity of community health services; and (2) that consensus assessments of the relative scarcity of health services can be predicted by a mathematical model using readily available data. The Wisconsin group thus did not attempt to define medical underservice conceptually or measure it empirically. They relied instead on the consensus amoung experts which emerged from their examination of profiles of the various areas regarding which areas were underserved. These profiles contained data on variables chosen by the experts from an initial list of more than 50 possible indicators. Finally, four weighted variables (infant mortality rate, primary care physician/population ratio, percent of population age 65 and over, and percent of population below the poverty level) were selected and combined into an index used to predict the experts' assessments of the extent of medical underservice.

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[2] Health Service Research Group, Center for Health Systems Research and Analysis, University of Wisconsin, "Development of the Index of Medical Underservice," Health Services Research, Summer, 1975, pp. 168-180.

The IMU is used to designate medically underserved areas both at the county and the sub-county level. Some of the national data used to compute the IMU are seriously dated. The percent of the population below poverty and percent of population age 65 and over are based on 1970 census data. The infant mortality rate is computed based on data for 1973 through 1977. However, the physician-to-population ratio is relatively recent (1978) and can be updated periodically. The scale used for IMU scores ranges from 0 to 100; the lower the IMU score is for an area, the more medically underserved the area is considered to be.

Two major issues are important to an assessment of the IMU. One is the lack of an explicit definition of medical underservice. Several researchers have expressed concern about this aspect of the IMU approach.[3,4,5] Each expresses concern about the lack of an underlying definition of underservice which can be empirically measured. They contend that this lack of an empirically verifiable concept makes the IMU difficult to interpret and also difficult to defend as a basis for policy formation.

The second issue concerns the problems that may result from using a mathematical model consisting of the weighted sum of four variables to generate IMU scores. If the variables are all highly correlated, three of them are not needed in the model; however, if they are not highly correlated, the use of four variables can lead to results which are difficult or impossible to interpret correctly for the reasons discussed in the section on standards for comparison. This problem is generic to approaches which use the weighted influence of several variables as shortage area designation criteria.

Utilization Deficit Index. The Utilization Deficit Index (UDI) was developed by Joel Kleinman, Bruce Cohen, Margaret Cooke and coworkers at the National Center for Health Statistics, PHS. The UDI estimates relative utilization of physician's services between areas and is

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[3] Wysong, J.A., "The Index of Medical Underservice: Problems in Meaning, Measurement, and Use." Health Services Research, 10:27, Summer 1975.

[4] Davis, K. and Marshall, R., "Primary Health Care Services for Medically Underserved Populations." Papers on the National Health Guidelines, pp. 1-23, DHEW Pub. No. (HRA) 77-641, Washington, D.C., U.S. Government Printing Office, Jan. 1977.

[5] Kleinman, J.C., and R.W. Wilson, "Are Medically Underserved Areas Medically Underserved?," Health Services Research, Summer, 1977, pp. 147-162.

intended to be an empirically based definition of medical underservice as well as a measure of unmet need.[6] Although it was specifically developed as an alternative to the Index of Medical Underservice, it is frequently mentioned as an alternative for manpower shortage area designation criteria as well.

The development of the UDI was a 3-stage process. First, expected physician utilization was estimated by using an individual's self-reported visits to a physician over a period of time from the 1974 National Health Interview Survey. The expected number of physician visits was defined as the overall U.S. average for all individuals with the same age, sex, and perceived health status. Next, the expected number of physicians' visits was subtracted from the actual reported number of visits, yielding an individual's "utilization deficit" (or surplus). Then, the average (mean) deficit for all individuals in a given county was estimated. In the second stage, the estimated deficit (or surplus) for the county is statistically associated with other characteristics of the area by use of regression analysis. This process yields an equation that predicts the expected utilization deficit for a county based on the characteristics of the county. In the final stage, the prediction equation developed in Stage 2 is used to produce Utilization Deficit Index (UDI) scores for all counties, both those in the NHIS sample and those not covered by the NHIS sample.

The data used to compute the existing UDI is from the National Health Interview Survey (HIS) conducted annually by NCHS. Approximately 470 counties from the 1974 HIS sample are used in developing the UDI. Information on an individual's utilization (as self-reported physician visits), age, sex, perceived health status' self-reported activity limitation, and restricted activity days are associated with information about those counties from the Area Resource File (i.e., per capita income, inpatient hospital days per capita, outpatient hospital visits per capita, percent of population black and whether the county is in an SMSA or not) to develop UDI scores for all the counties in the United States. Although UDI scores are predicted for all counties in the U.S., the actual difference between self-reported utilization and expected utilization is available for only the 470 counties from the NHIS survey, and it is assumed that the prediction equation developed in Stage 2 is applicable to the counties where direct measures of physician utilization are unavailable. Kleinman, et. al. are currently working on another version of the UDI which would combine data from the 1976-78 NHIS Surveys; that version is expected to be available in the near future.

6/ Cohen, B.B.; Cooke, M.A.; and Kleinman, J.C., "The Utilization Deficit Index: An Indicator of Relative Medical Underservice" in the Silver Anniversary of the National Health Survey Act, Contributed Papers Session, U.S. Dept. of Health and Human Services, Public Health Services, Office of Health Research, Statistics and Technology, National Center for Health Statistics.

Two advantages are claimed for the UDI over other currently available indexes. Because it is a consumer-specific index (i.e., it is based on information about the consumers in an area rather than information about the providers) it reduces the problem of choosing a rational service area that occurs because of the inaccuracy introduced into provider-based indices when consumers cross service area borders to get their medical services. Also the UDI uses units that are easy to interpret and compare. For example, if an area has a UDI score of .5, the area's residents have an estimated average of .5 fewer visits per year than they are expected to have given the health status, age and sex composition of that area.

When consideration turns to the types of shortages that the UDI can effectively screen, two issues deserve discussion. Since the utilization deficit (or surplus) measures the difference between the expected utilization of a group given its age, sex and perceived health status characteristics and the self-reported actual utilization of the group, UDI can be used to measure one aspect of medical underutilization. The important issue in this case is the stability of the relationship expressed in the prediction equation. To develop the prediction equation many different variables that describe the health characteristics and sociodemographic characteristics of a county were associated with the mean utilization deficit index for that county. These variables, although expected to be related in some way to health services utilization, were not chosen on the basis of any theoretical rationale. All that was required of them was that they had the strongest empirical association with the utilization deficit score. Unfortunately, the empirical associations are not strong because all the variables in the prediction equation only explain about 1/5 of the variation in the mean utilization deficit for the 470 counties. Thus, it is possible that these variables may be associated with UDI scores only for those particular counties and only during that period of time and do not necessarily represent stable long-lasting associations between those county descriptors and the UDI score. Hopefully, the work that is being done on the UDI with HIS data from 1976 to 1978 will help resolve this issue. If the prediction equation developed using the 1974 data and the one developed using the later data are similar, both in the variables that are included and in the magnitudes of the associations of those variables with the utilization deficit score, then more confidence can be attributed to the stability of the relationships expressed in the prediction equation. Consequently, more confidence could be had in to applying this prediction equation to other areas and in other time periods.

To use the UDI as a screen for "unmet need," additional assumptions are required. If the amount of unmet need (whether clinical or perceived) is defined as the difference between the utilization needed by a population and its actual utilization, then for the UDI to measure the amount of unmet need, it must be assumed that the expected (i.e., mean) utilization of a group given its age, sex and health status characteristics measures the population's needed utilization. Alternatively, if the population's expected utilization is related to some average but unknown amount of needed utilization, then differences in actual utilization between areas could represent differences in the amount of this average need that is unmet.

Deaths Averted Index and Use/Need Index. The Deaths Averted Index, (DAMI), developed by Dr. Jack Hadley of the Urban Institute in Washington,D.C.,[7] is another index considered and compared with both the IMU and the current Health Manpower Shortage Area designation criteria. DAMI is intended to measure the number of deaths in a population that would be averted per unit increase in medical care expenditures. That information might be used to develop alternative estimates of manpower shortages.

To develop the DAMI, Hadley estimated a series of "health production functions" using aggregate, cross-sectional data for 1970. He extracted socioeconomic information by age, sex, and race for over 400 county groups (groups of contiguous counties) from the 1970 census and coupled it with age-sex-race specific mortality rates from death certificates from 1968-1972. Estimates of the impact of medical care on mortality, the measure of health used by Hadley, was obtained by statistically holding fixed the effects of a number of social demographic, behavioral and environmental factors in addition to effects of medical care use which was measured by Medicare expenditures per enrollee in each county group. "Health," the independent variable, was measured by an inverse indicator, the age-sex specific mortality rate for three different age groups---infant mortality, mortality rate 45-65 years, and mortality rate 65 and over. Although the DAMI was developed by using data on county groups, Hadley has developed DAMI scores for almost all counties in the United States by using the production function he estimated for groups of counties to impute scores for individual counties. There is little likelihood that DAMI scores will be able to be directly estimated for sub-county areas in the near future.

The Use/Need Index (U/N), the ratio of Medicare expenditures per Medicare enrollee to the unadjusted mortality rate, was used by Hadley for those areas where the requisite information to construct the Deaths Averted Index was not available. The two indexes are highly correlated, and therefore, might be used in place of one another. The U/N index is routinely available for individual counties, and the outlook for the U/N index is somewhat more promising for application at the sub-county level.

In his work Hadley contributes significantly to the body of knowledge regarding alternative measures of service shortage. He convincingly points to the advantages of using consumer-based measures of utilization as measures of availability of services. However, to believe that DAMI actually measures the deaths that would be averted per unit increase in expenditures for health services requires the acceptance of long causal sequence of events regarding relationships between efficacy of medical intervention, expenditures, utilization, health status, and death. These relationships have been the subject of continuing debate and remain unresolved today, Hadley's work notwithstanding. Hadley is reasonably successful in establishing a negative statistical relationship between age-sex-race specific infant and adult mortality rates and medical care use. However, when total mortality is replaced with two alternative measures of preventable mortality (one far more inclusive of diseases and thus closer to total mortality than the other), the relationship remains for the more inclusive definition but disappears for the specific one. Dr. Hadley concludes that the subjective nature of the definition of preventable mortality is the reason for the results. Another possible interpretation is that the relationship may not exist.

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[7] Hadley, J., More Medical Care, Better Health? An Economic Analysis of Mortality Rates, The Urban Institute Press, Washington DC, 1982.

A second issue regarding interpretation of the DAMI is the use of a rather simple cross-sectional model to investigate a very complicated relationship at least some aspects of which are longitudinal. Mortality reflects the cummulative affects of prior disease, genetics, environment, life style and many other factors. In addition, the influence of expenditures on mortality is likely to be both current and cummulative. To identify such a complicated causal relationship by observing empirical associations on cross-sectional mortality requires many simplifying assumptions as Dr. Hadley points out.

Sources of Data

Several different sources of data on counties are used in the evaluation study in this chapter (as well as in others). By far the most extensive is the Area Resource File (ARF)--a computer-based, county-specific health resources information system useful for many analytic studies. It contains numbers and characteristics of health professionals as well as related data available for all counties in the United States. The purpose of the ARF is to facilitate health professions analysis by integrating information from many disparate sources into a single file. The ARF now contains a wide range of health and socioeconomic data (approximately 3000 data elements) of use in health systems research, analysis, and planning at both National and local levels.

Additional county data were obtained from several different sources. The Primary Care Health Manpower Shortage Area (PCHMSA) File contains information collected from geographic areas (county and subcounty) applying for designation as a primary care health manpower shortage area. The Medically Underserved Area (MUA) File contains the information necessary to develop both county and sub-county scores for the Index of Medical Underservice (IMU). Two files were obtained from NCHS. One contains the computed UDI scores for almost all counties in the United States. The second contains extracts from the 1974 National Health Interview Survey, including the observed utilization deficit, self-reported utilization, activity limitation, and perceived health. This information is available for approximately 470 counties. Finally, Dr. Jack Hadley of the Urban Institute provided a data file containing the DAMI and Use/Need scores which he computed for almost all counties in the U.S.

The Mathematica Policy Research (MPR) File is a compendium of data collected from two national physician capacity utilization telephone surveys that were conducted to gain vitally needed information on access to primary care physicians. Data include information on physician practices as well as physician scheduling and work patterns on approximately 250 primary sampling units (PSUs) in the U.S. In only a few cases are PSUs a single county; usually they consist of groups of contiguous counties.

Various county level data were aggregated to the PSU level and merged with the MPR data which was the primary source of the measures of excess (unmet) demand, insufficient capacity and access. Several assumptions are necessary to generalize the results of the supracounty analysis to the designation process. Those are noted here and should be used as caveats when interpreting the findings of the analysis of the MPR data. First, it must be assumed that a relationship between variables at the supracounty level of analysis will also hold at the county level or below. Secondly, aggregation of variables from the county to the PSU was usually a simple summation, but not always. Some variables including the UDI, IMU, and DAMI, presented more complex problems. With these indices, the prediction equations developed for the county level were used to generate scores at the supracounty level; therefore, it must be assumed that the same predictor variables and the same magnitude of association between those predictors and the indices exists at the higher level. Thirdly, one must assume that the aggregation to the PSU (based as it is on multiple counties) will not change the variation exhibited by variables at the county level, thereby obscuring the true associations.

Types of Empirical Analysis

This section discusses the empirical comparisons and analysis from which the conclusions about the relative performance of the HMSA criteria and the various alternatives are drawn. The tables containing this information are referenced here and throughout the findings and are presented in Appendix D.

Simple Correlations (Table D-1,). For a measure to identify a characteristic of an area it must be correlated (i.e., vary in a systemic way) with that characteristic. Simple correlations are appropriate for establishing empirical associations between variables.

In this study, rank order correlations were used to measure the associations between the ranking of geographic areas by different measures and indices and to compare their effectiveness as screens. A high positive rank order correlation indicates that two measures rank the counties similarly. Perfect agreement on the two rankings would be indicated by a correlation of one. Perfect disagreement (i.e., the area the first measure ranks first, the second measure ranks last) is indicated by a minus one. A correlation of zero indicates there is no association between the two rankings.

Measures for each of the types of shortage, and all the indices, including the major criterion of HMSA (POP/FTE), were compared by rank-order correlations. Relative patterns of association will explain which indices are superior at identifying specific alternative definitions of shortage. A large rank-order correlation, either positive or negative, indicates that the two measures identify the same types of characteristics in areas.

Factor Analysis (Principal Components) (Table D-2). Simple rank-order correlations indicate the association between two measures, but do not indicate how a whole group of measures associate with each other. Principal Components Analysis, a variant of Factor Analysis, clusters measures that are highly associated with each other, while still leaving each cluster or group as a whole unassociated with any other group. Sometimes, interpretable groups are identified; sometimes the groups do not have an apparent interpretation. Fortunately, the groups of variables fell into fairly homogenous groups in the county-level analysis; however, this outcome did not occur at the supracounty level.

Crosstabulations (Tables D-3 to D-8). Neither simple correlations nor factor analysis give the number of instances of agreement and disagreement that would result if alternative measures were used to designate manpower shortage areas. Regardless of the correlation between two measures, it is important to know if they disagree, say, on the designation of 50 counties out of 700 or 500 out of 700. Crosstabulations give this type of information. Counties were ranked by all the alternative measures and indices and the four quartiles of each measure were compared with the HMSA designation status as of December 1980. This compilation produced a series of crosstabulations from which the number and the percentage of agreement/disagreement between HMSA and each alternative approach to designation was derived.

Mean Ranks by Groups (Tables D-9 to D-19). Crosstabulations indicate the number of and percent agreement on designation status between alternatives, but they do not tell anything about the characteristics of the areas on which there is agreement or disagreement. To develop that information, the areas (both counties and PSUs) were given a rank from 0 to 99 (according to where they were positioned in the percentile distribution for all areas) on each of several different measures used to indicate various types of shortage such as access, need, and health status. For each index-to-index comparison, the areas were then divided into groups: those that are currently designated by HMSA and that would also be designated by a particular alternative index in one group, and those that neither HMSA nor the alternative would designate in a second group. A third group contains areas designated by HMSA but not by the alternative, and the last group contains those areas where the opposite is true. The types of counties ending up in the latter two groups have implications for the differences in emphasis of the alternative criteria.

An example should help clarify the discussion. Consider one characteristic--infant mortality. All counties are ranked from 0 to 99 according to how their infant mortality rate compared with other counties. If a county has an infant mortality rate in the upper one percent of all counties, it would be given the number 99 for infant mortality. When the counties are divided into groups as described above, the average percentile ranking of the counties in a group can be computed. If the average percentile ranking is very low or very high, that indicates that the counties in that group exhibit an extreme amount (or lack of) the characteristic. Thus, the selection process which placed them in that group has screened the counties for that characteristic. To continue the example, if the counties in a group have an average percentile rank of 12, it would indicate those counties have very low infant mortality compared to other counties. If the number is 85, it would indicate very high infant mortality. On the other hand if the number is 50 and the individual counties varied substantially, it would indicate the counties are typical of all U.S. counties and that the group had not been screened for high infant mortality.

Findings of the Empirical Comparisons

Finding 1: The correlation between areas designated by the HMSA criteria and those by alternative indices is not strong. A large number of counties that are designated using HMSA criteria would be replaced by different counties if an alternative index were used for designation.

Approximately 2600 counties in the U.S. were ranked from highest to lowest according to each of the following criteria: 1) the adjusted population to full-time-equivalent primary care physician ratio (using local data for designated counties) as used in the HMSA criteria (POP/FTE); 2) the unadjusted ratio of population to number of primary care physicians (using national data for all counties) from ARF (POP/MD); 3) the Utilization Deficit Index (UDI), 4) the Deaths Averted Index (DAMI); 5) the Use/Need Index (U/N); 6) the Index of Medical Underservice (IMU); and (7) infant mortality.

Each of the rankings was compared to the HMSA ranking (POP/FTE) to discover the extent of agreement between them (see Table D-1,). The strongest agreement was between HMSA and POP/MD. The rank-order correlation between them is 0.75, which indicates very similar but not identical rankings. This outcome is not unexpected; the POP/MD ratio is a head count of population and physicians without the adjustments for the composition of the population and the productivity of physicians that is actually made by the HMSA criteria.[8]

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[8] The POP/FTE ratio includes physician equivalency adjustments for those counties that have made application to be wholly designated. For the remaining counties, the population is adjusted using national data but the number of physicians is not adjusted. When rank-order correlations are computed between POP/FTE and other variables only for those counties that have had the number of physicians adjusted, the correlations are generally smaller.

The next highest agreement is between POP/FTE and the IMU. The correlation is -0.6 which is moderately strong. The other three alternatives exhibit very weak rank-order agreement with POP/FTE. The correlation between DAMI and POP/FTE is 0.289; between UDI and POP/FTE it is -0.145; and between infant mortality and HMSA it is 0.07 (virtually zero).

These results indicate substantial lack of agreement between HMSA and the alternatives on the ranking of counties and thus substantial differences in the counties that each alternative would designate. This result is confirmed by comparing the counties actually designated using the HMSA criteria with those hypothetically designated by each alternative. All of the counties in the U.S. were divided into quartiles according to each index. Then, the counties were crosstabulated by quartile and HMSA designation status; that is, the number and percent of counties in the highest quartile (most indicated for designation) for a given index and also designated using the HMSA were computed. These were also computed for each of the other quartiles and HMSA designation status.

The crosstabulation for HMSA and POP/MD reflects their strong but less than perfect correlation (Table D-3). Of the quartile of counties with the highest POP/MD ratio (i.e., least availability) 525 out of 656 (80 percent) are either wholly or partly designated. However, 131 (20 percent) are not designated. This is a substantial number of disagreements between the two alternatives. There is a much smaller number of disagreements for the counties HMSA would designate but POP/MD would not. Only 30 counties out of 656 (4.5 percent) of the counties in the lowest quartile of POP/MD are wholly designated. (These descrepancies are fully explained in Chapter IV and are given here only as part of the comparison).

Of the 657 counties constituting the most underserved quartile of counties according to the IMU, 444 (68 percent) are wholly or partly HMSA designated (Table D-4). This overlap leaves 213 (32 percent) counties that HMSA does not designate but which are in the lowest quartiles of all counties on the IMU. Again, there is a much smaller number of counties which HMSA designates but IMU would not. Only 17 (2.6 percent) of 653 counties in the higher quartile of IMU are wholly HMSA designated.

The number of disagreements are much larger when HMSA is compared with the remaining indices. The HMSA criteria have not designated 38 percent of the counties that DAMI would (Table D-5). These figures are very similar (40 percent) for Use/Need (Table D-6) and for infant mortality (Table D-7) but increase to 55 percent for the UDI (Table D-8). On the other side of the coin, HMSA designates 18 percent of the counties that DAMI clearly would not designate; for UDI it is 24 percent, and for infant mortality, 32 percent.

These findings indicate that a substantial difference in the counties selected for designation would occur if one of the alternatives were used to designate health manpower shortage areas (other than the HMSA criteria).

Finding 2: The counties that would be designated by both HMSA and each of the alternatives have a common set of sociodemographic characteristics.

The extent of disagreement discussed under Finding 1 does not reveal anything about the characteristics of the areas that would be selected by each criteria. The mean rank by group discussed in above was therefore used to develop information concerning the characteristics that are screened by the various alternatives (Tables D-9 to D-19).

The degree to which a characteristic is screened is found on a continuum ranging from no screening (i.e., an average percentile rank of 50) to perfect screening (i.e., if a quartile of counties are designated, the average percentile rank would be either 12.5 or 87.5). To aid in intrepretation, an average percentile rank in the upper 30 percent (70 or greater) or the lower 30 percent (30 or less) is taken as an indication of substantial screening.

When HMSA designation is compared with the designations that would result from each alternative in turn, a group of counties that both would designate is isolated. The number and percent of agreement vary with each alternative, but a set of common sociodemographic characteristics emerges (Tables D-9 to D-13).

The counties designated by both HMSA and each of the alternative indices rank in or near the upper 30 percent of all counties on percent of population with income below the poverty level in 1970. In addition, their 1977 per capita income and their average level of education rank in the lower 30 percent. The extent of urbanization as measured by the percent of the population classified as urban in 1970 also ranks in the lower 30 percent. A greater proportion of these counties are from the South than are the counties in which there is disagreement regarding designation (see bottom of Tables D-21 to D-25).

Two non-sociodemographic characteristics are also screened in this group of counties. The charge for routine office visits by physicians (Tables D-14 to D-16) are lower than for other counties and the perceived health of the population is not as good (Tables D-17 to D-19). Emerging from this information is the finding that a certain group of poor, rural counties mostly in the South would be designated regardless of the choice between these alternative criteria.

Finding 3: Although there is substantial disagreement between the indices regarding the areas they would designate, little discrimination occurs between the characteristics of the areas on which they disagree.

Since large numbers and high percentages of disagreements occur regarding the counties that would be designated using the alternative criteria, it might be expected that these disagreements occur because the different criteria are selecting counties with different characteristics (just as the areas designated by all the indices have some similar characteristics). While this hypothesis may be true, it cannot be detected with the measures that are used in the study. Thus, with only one exception, the alternatives are rather specific and cannot be used as criterion measures for other characteristics. Instead of becoming less typical, the areas on which there is disagreement become more typical of all counties or all PSUs! This is especially true for counties that the alternative would designate but HMSA does not. Frequently, the only characteristic on which the counties in this group rank in the upper or lower 30 percent of all counties is the alternative index itself.

Thus, the only distinguishing characteristic of those counties that infant mortality rate would designate and HMSA does not is that they have high levels of infant mortality (Table D-12). This result is desirable if infant mortality is the only characteristic to be screened, but points out that infant mortality is a very specific screening criterion and cannot be used as a criterion for other characteristics. In contrast, the counties that HMSA designates but infant mortality would not, are poorer, more rural and make less use of hospital outpatient and emergency rooms than typical counties but have low levels of infant mortality.

Little additional discrimination is provided for counties that would be designated by UDI but are not designated by HMSA (Table D-13). They do come disportionately from the South when compared to the counties where the disagreement is reversed. They are also more likely to be non-SMSA counties than their counterparts (see bottom of Table D-25). This result does not carry over to the percent of the population classified as urban, which is lower for the counties HMSA designates but UDI would not. Otherwise, the counties in both groups are rather typical of all counties of the U.S., except for UDI in the former and POP/FTE in the latter.

The same pattern occurs with DAMI or Use/Need compared to HMSA (Table D-11). Differences between the characteristics of the counties Use/Need would designate but HMSA did not, and their counterparts when the opposite is true, are small. The first group has slightly higher adult (not infant) mortality rates and somewhat higher perceived needs, whereas the counties in the second group are slightly poorer and more rural. However, these differences are not large enough to conclude that the groups are actually screened differently from the standpoint of statistical significance.

The only case where substantial discrimination occurs is when HMSA is compared to IMU. The counties that IMU would designate but HMSA does not continue to be screened for poverty. On average they are in the upper 30 percent of all counties on the percent of their population below poverty in 1970 and in the lower 30 percent on 1977 per capita income (Table D-10). They are largely from the South and are small non-SMSA counties (see bottom of Table D-22). In addition, they have higher perceived health problems (Table D-17). About the only distinguishing characteristics about the counties HMSA designates but IMU would not are that a smaller percent of their population is urban and they come more from the Midwest.

Therefore, although all of the indices tend to identify a subgroup of the poor, rural, less educated areas of the U.S., the IMU identifies more such areas. Not only does it select a large number of those counties in agreement with HMSA, it continues to identify them when HMSA does not.

This finding is not surprising since percent below poverty is part of the IMU criteria. Otherwise when the alternatives disagree, they largely isolate areas that are fairly typical except on the index itself.[9]

Finding 4: None of the indices including the current HMSA is effective at screening for "health status" or "clinical need" as measured by indices of mortality.

This study used (a) infant mortality, (b) the overall mortality rate of three cohorts (infants, adults between 45-65 years of age, and age 65 years and over) as developed by Hadley, and (c) crude death rate as alternative and conjoint measures of "health status" and "clinical need." It is well known that the measurement of these two concepts is controversial; however, the mortality statistics are widely available and capture some of the essence of health or clinical need, and are therefore useful.

None of the indices, however, are effective in screening areas for these characteristics. Surprisingly, DAMI and Use/Need do not give any better results than IMU or UDI. The counties that each would designate rank in the 50th or 60th percentile of all counties for the three mortality measures. This performance is not sufficient for effective screening, since the "designated" counties have only slightly higher mortality rates than are typical of all U.S. counties.

On the other hand, HMSA and POP/MD, measures of availability, do not serve as a screen for any of the three mortality indicators. One could select counties with high mortality about as well by identifying them randomly as by using either of these criteria. (This result is not unexpected given that the rank-order correlation between POP/MD and measures of mortality is very small.)

A more striking finding is the specificity of the different measures of mortality. The counties that infant mortality alone would select for designation obviously exhibit very high levels of infant mortality, but they are rather typical counties with regard to adult mortality and per capita deaths. This finding may explain why the DAMI did not screen these variables as well as expected. Since DAMI uses the combined effects of infant and adult mortality, the influence of any one alone could be obscured. This result is confirmed by the findings from the factor analysis (Table D-2). DAMI is associated with three different clusters. One cluster contains infant mortality; the second contains both a measure of the density of elderly people in the population and per capita deaths. These results suggest that DAMI captures the general influence of three different cohorts (infants, 45-65 years, and over 65 years), but does not effectively isolate any of them.

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[9] It should be noted that the proportion of the population in or families below the poverty line is very sensitive to the definition of poverty; changing the poverty line clearly would lessen the difference.

Given the specificity of the measures of "health status" and "clinical need," it can be concluded that if counties are to be screened for these characteristics, it is better to select the particular aspect of interest (i.e., infant mortality), and use the best available measure to screen counties for that characteristic either separately or as part of a system of priorities (See discussion of multiple goals, Chapter II).

Finding 5: Counties with high levels of "perceived need" are relatively well identified; however, some indices select such counties more effectively than others.

"Perceived need" is measured by average perceived health status and self-reported limitation in activity that are available for the HIS sample of approximately 470 counties. Those counties on which there is agreement (i.e., those in the highest quartile of POP/FTE and of DAMI, UDI, and IMU respectively) exhibit higher than average perceived need. They are in or near the upper 30 percent of all counties in the sample. Thus for counties on which the alternatives agree, fairly good screening on these variables occurs (Tables D-17 to D-19).

The relative ability of the alternative indices to screen on "perceived need" is revealed by the analysis of the counties on which there is disagreement.. Among the alternative indices, IMU is most effective at identifying counties with high "perceived need." The average ranking of counties it alone selects is at or near the upper 30 percent of all counties (Table D-17). DAMI and UDI do not screen for perceived need as well as IMU. They select counties in the low 60's or high 50's. It is apparent that the HMSA criteria do not screen for perceived need separately from the alternatives. In fact, perceived need is less than average for those counties that HMSA would designate and the alternatives would not.

Finding 6: None of the indices is effective at selecting areas with extremes of demand, excess demand, or utilization.

Most of the alternative measures of demand, excess demand, access, or utilization were obtained from the Mathematica Survey (see Tables D-14 to D-16). As discussed earlier, several problems arose in the analysis of those data. In addition, the same comments that preceded the findings on health status apply here. The measurement difficulties attendant to this analysis should not be underestimated. Nevertheless, very interesting results emerge. The major finding is that none of the existing indices, including HMSA, are effective at screening areas on demand and access characteristics as measured here.

The results from the Mathematica data will be discussed first. POP/MD was used in place of HMSA at the PSU level since the designation status of individual counties cannot be easily applied to the multiple-county PSUs. Regardless of which alternative index was compared with POP/MD, effective screening did not occur between groups of PSUs. With respect to the measures of demand, excess demand, access and utilization, those PSUs that are in the highest quartile of both POP/MD and each alternative do not differ from those PSUs in the highest quartile of only one or from those that are not in the top quartile of either. The average percentile rankings hover in the 40's and 50's so uniformly that it is simpler to discuss the few exceptions.

For those PSUs that would be designated by POP/MD and either UDI, DAMI or IMU, the charge for a routine office visit to a physician (a measure of demand conditions in the PSU) is in the lowest 30 percent of all PSUs. In addition, it appears that PSUs designated by POP/MD have a slightly higher proportion of Medicaid patients in the physicians' practices (an access measure), and that the patients' wait in the physicians' offices is a little longer. But, with the exception of charge for routine office visits, the discrimination is not sufficient to conclude that effective screening for access is occurring. The only direct measure of utilization, self-reported visits to a physician per year, is available for the 470 counties of the HIS sample. None of the indices screen for it effectively (Tables D-17 to D-19).

HMSA was best at screening counties for the population's use of outpatient departments and emergency rooms in hospitals. These measures are frequently mentioned as measures of insufficient capacity. Unfortunately, the counties HMSA selects have less than average per capita usage of hospitals, so it isolates counties with less than average "insufficient capacity." None of the indices including POP/MD screened PSUs for differences in the productivity of physicians as measured by patients seen per hour and per week (POP/FTE was not available at the PSU level).

Although these results may be disappointing, it should be recalled that sociodemographic factors such as per capita income and percent of population below poverty are effectively screened. These variables are not considered as measures of excess demand, but they may have some association with the general level of demand and therefore with utilization.

Finding 7: HMSA is the most effective criteria as a screen for "availability."

This finding is not unexpected because the measure of availability was defined as the population to physician ratio. Consequently, it follows from the definition that HMSA would be the best manpower availability screen, in the same way that UDI is the best screen for utilization deficit. Nevertheless, availability is the major goal of manpower programs and the alternatives should be compared for their ability to screen it.

Besides HMSA and POP/MD (Table D-9), no other index screened effectively for availability. For those counties that UDI would designate but HMSA did not (Table D-13), the POP/MD and the POP/FTE ratio was slightly below the average for all counties, indicating better than average availability. This was also true for Use/Need (Table D-11). Counties that would be designated by infant mortality but not by HMSA have substantially better than average ratios and thus better than average availability (Table D-12). Only the IMU selected counties that had slightly worse than average ratios (Table D-10).

Conclusions

Three major conclusions emerge from these findings. First, there is a small core group of counties that would remain designated regardless of which alternative criteria were used. In addition to ranking high on POP/FTE and each of the three alternatives indices, these counties are characteristically poor, rural and mostly Southern. The IMU performed the best at selecting counties with the above characteristics, not surprisingly, since it includes the weighted influence of several variables including percent of the population below poverty. This weighting approach, however, has the advantages and disadvantages previously discussed. The generality of the IMU tends to prevent it from being specific at screening any one particular characteristic.

Second, besides this core group of counties, there is little discrimination in terms of identifiable characteristics of counties designated by the different alternatives. Each index is rather specific in its screening capability; that is, UDI screens for high UDI, and IMU for low IMU. However, although both are intended to measure underservice, they frequently disagree. Moreover, it is not clear what characteristics the areas screened by either have in common. Similarly, DAMI screens for expenditures (utilization) in relation to mortality. However, acceptance of a long sequence of causal assumptions is needed to believe that it also screens for deaths that would be averted if expenditures or manpower were increased.

Finally, any alternative to HMSA, which is clearly availability-based, is faced with a significant problem if it is intended for use in a program where the only policy intervention is placing physicians or other health personnel in a geographic area. If such an alternative effectively screens for availability, it will select essentially the same counties as HMSA. (This is the case with the core group of counties with characteristics that all of the alternatives would designate.) In this case, it would add no new information. If the alternative does not screen for manpower availability as measured by POP/MD, it is because the characteristics it screens for are not associated with the density of physicians in an area. This generates little confidence that placing more physicians in the area is an effective way to address the problem.

Given the specificity exhibited by most indices and measures of shortage, it can therefore be concluded that it is better to select the type or types of shortage of interest and use the best available measures to screen for them either separately or as part of a system of successive priorities. Indices that use complex combination of shortage criteria lose that specificity.

Thus, given that the policy intervention intended is the placement of physicians or other health personnel in the designated areas, it seems appropriate that the basic shortage concept screened for should be availability. Of the alternatives examined in this chapter, POP/FTE or the HMSA criteria themselves are clearly the best screen for availability. Other indicators or indices could be used to determine priorities among designated areas, in order to direct resources to those areas having both low availability and high unmet need and/or high unmet demand, but the first screen for designation should continue to be availability.

CHAPTER IV

EVALUATION OF THE ACCURACY OF THE APPLICATION OF THE HMSA CRITERIA

Since the inception of the shortage area designation program early in the 1970's, hundreds of requests for designation have been received and reviewed by the HMSA staff. As of December 31, 1981, a total of 2,033 primary medical and 916 dental shortage area designations were in effect. Although all designations are periodically reviewed for both accuracy and currency, and corresponding redesignation and dedesignation actions taken when appropriate, the volume of staff activity is such that some errors in designation undoubtedly occur. Moreover, the situation in some designated areas may have improved without the HMSA designation staff being informed; or, similarly, areas which have not previously qualified for designation may have experienced losses of manpower which have not been reported to the HMSA designation staff.

The purpose of the first part of this chapter is to determine, insofar as is feasible, the extent of error in applying the current HMSA criteria, including both errors of omission (false negatives) and errors of commission (false positives). To this end, the analysis presented here accepted both the existing criteria and their underlyng objectives as given, concentrating upon the accuracy of the process in implementing the criteria.

The second part of the chapter presents a summary of the results of case studies of 26 localities in three areas--New York City, Los Angeles, and rural West Virginia. These case studies were conducted specifically for this report and were aimed at providing local area views of the HMSA criteria and their application. They dealt not only with the accuracy with which the criteria had been applied, but also examined additional statistical indicators of shortage, beyond those of the HMSA criteria, which might support or contradict the official findings of shortage or nonshortage arrived at by using the criteria. In addition, a number of local officials were interviewed during the course of the case studies and their views on the appropriateness, utility, and applicability of the current criteria were sought, together with their suggestions for possible changes. A summary of the findings of the case studies is presented in the second part of the chapter. (Appendix E contains a more detailed discussion of the case studies.)

Overall Accuracy of Application of the Criteria to Whole Counties.

Before discussing the analyses reported on in this section of the chapter, it may be worthwhile to reiterate a few of the more salient factors about the designation process and about the information used for designation. Available national data are employed by the HMSA designation staff to periodically review the situation in all areas of the Nation, in order that undesignated areas potentially eligible and designated areas potentially ineligible can be identified to local officials. In this periodic review, State and local agencies and organizations are provided information on these areas for their review and for their recommendations as to whether they should or should not be designated. Between these periodic reviews, individual designation requests are considered on a case-by-case basis, final actions to designate or dedesignate particular areas taken only after review by an organization or individual at the State or local level. In addition to the desirability of having maximum State and local involvement in the designation program, this procedure also has the practical justification that national-level data alone are generally inadequate to determine the current, actual designation eligibility of an area based on its particular circumstances.

The same problems of data shortcomings at the national level also limited the degree to which existing designations could be assessed for this report. However, the availability of relatively current county-level data on population and practitioners means that the designation status of whole-county areas can generally be evaluated with the most current national data, particularly where possible adjustments for indicators of high unmet need and insufficient capacity do not need to be considered. Where these later indicators are needed, nationally available data are not always adequate to fully ascertain a county's proper designation status, although a good first approximation can be made by using available poverty and infant mortality data.

For part-county designations, however, both the review of existing designations and the consideration of potentially eligible areas must rely almost entirely upon data which are not now consistently available on a compatible, current basis at the national level. Thus, in attempting to determine from a national perspective whether the current designation process is designating accurately those areas that meet the criteria, only the status of whole counties can be reviewed.

Local applicants for designation initially propose their "rational service areas," and all interested agencies and organizations are given an opportunity to review, and, if necessary, to disagree with the validity of the service area in any proposed designation. Most subjectively based errors resulting in the designation of areas without a real shortage would largely be the result of the identification of inappropriate service areas that do not accurately encompass both the population involved and the practitioners serving them. Unfortunately, there is no feasible method of independently evaluating the appropriateness of local service areas by the HMSA staff, particularly given the large numbers of requests made for designation actions. However, two of the three essential factors governing designation of HMSAs are for the most part based on verifiable and objective statistics. These are the population-to-practitioner ratios of the area and its contiguous areas. Changes in either the numbers of practitioners or in the population, however, can occur unrecognized so that shortage areas may either develop without their being officially designated or shortage area problems resolved without withdrawal of their designation. To determine if errors of this sort exist, data on population, practitioners, and health status characteristics were analyzed for all U.S. counties, independent of their designation status. The apparent designation status of these counties was then compared with the official designation status of these counties, to identify reasons for any differences in designation.

The data source for this comparison was the Shortage Area Data Base (SADB), an integral part of the shortage area designation program. Data from all designation activity since 1978 is included in the SADB, a computerized file maintained by the HMSA staff of the status of all U.S. counties--whether they are wholly designated, partially designated, or not designated. Created in 1978 and originally consisting of the most recent county level data on health professionals population, health status indicators, this file now contains these data plus pertinent information on all designated shortage areas drawn from the case-by-case analysis of areas that have been reviewed for designation, designated, dedesignated, or continued in designation. It also contains current information provided by reviewers as a result of the HMSA program's periodic review. For designated areas, the data on file represent those accepted as valid at the time of designation or through a more recent update. In instances where this more up-to-date information is provided by reviewers, that information is entered into the SADB, superceding the previous data. In addition, when new national data at the county level become available, this information supercedes the previous national data, but only for those counties that are not wholly or partially designated. Data in the SADB thus represent a combination of locally provided and nationally available information summarizing the most current and accurate data insofar as they have been employed for designation decisions.

In the assessment that follows, present designations based on the data in the SADB as of 12/31/80 have been examined in relation to potential designations that would appear proper if the most current, nationally available practitioner and population data were employed. Where potential designations appear indicated but official designations have not actually been made, the possible error shows up as a preliminary "false negative" error. These were investigated not only as to whether the areas had since been designated (in the interim between the 12/31/80 data and the present time), but also for other possible causes of non-designation, such as high availability of care in contiguous areas. If no sound cause was identified, the area in question was then identified as a probable "false negative" misdesignation.

Where official designations exist but potential designations would not have been made on the basis of currently available national data, the possible error shows up as a "false positive" error. These errors were also investigated, largely for interim dedesignation action and for other legitimate rationales for designation, such as adjustments to the population-to-practitioner ratio or indicators of high unmet need. If no sound cause is identified, the area in question is then identified as a probable "false positive" designation. Comparisons and findings for primary medical and dental shortage area designations are presented below, in that order.

Accuracy of Primary Medical Care Shortage Designations. The analysis conducted for the study of possible errors made in identifying primary medical care shortage area designations was able to make use of recently obtained national data on the distribution of physicians and population, and to employ these new data in the analysis before they had even been employed in the designation process, therefore providing a more sound test of the current accuracy of the designations. The new national data consisted of December 31, 1979, county-level allopathic physician (M.D.) data from the AMA by specialty, 1980 county-level osteopathic physician (D.O.) data from the AOA, and county population data from the 1980 Census.

The findings as to the existence of "false negative" errors--where counties appear to be designatable but have not been officially designated--are presented first. In this comparison of actual designations with potential designations based upon the new national data, there was a total of 130 counties which appeared initially to represent false negative errors. These included 36 counties where the new national data showed an increase in the population-to-practitioner ratio (as compared with data in the SADB); 71 areas where both data bases showed county ratios which seemed to qualify the county for designation; and 23 areas where the population-to-practitioner ratio alone would not qualify the area for designation, but in which high infant mortality rates were also present. All of the apparent false negative errors were investigated further.

In 6 of the 130 instances, a full designation review had already been conducted in the interim period; of these, 5 of the 6 had been determined to be eligible and one ineligible. In 115 of the remaining 124 areas, contiguous area resources (based again on their population-to-practitioner ratio) were adequate enough to make the area ineligible for designation. The remaining 9 areas showed no clearly identified reason for their lack of designation, and thus were determined to be "false negative" errors. (See following table.) These 9 instances represented less than 6.0 percent of all those cases earlier identified as possible false negative errors, 1.0 percent of the 846 total whole county designations, and only 0.3 percent of all whole counties.

Possible False Negative Error Review Results

	Possible Error Total	Reason for apparent error: Interim Designation Review	Reason for apparent error: Contiguous Resources Present	Reason for apparent error: No Identified Reason
Total possible false negative errors	130	6	115	9
Areas where national data showed physician decline	36	3	32	1
Areas where physician supply unchanged	71	0	65	6
Areas with high infant mortality rates qualifying them	23	3	18	2

The findings as to the existence of "false positive" errors are less clear and more difficult to identify, largely because of the need for estimation of some of the data needed. A total of 257 areas were initially identified as possible "false positives" because the recent national data did not seem to support their existing designation. This represented nearly one-third (30 percent) of the 846 whole-county areas designated. The analysis of these 257 areas first divided them into two groups--the 219 areas that had achieved designation on the basis of practitioner/population ratios alone, and the 38 areas that had been designated on the basis of both the practitioner/population ratio and indicators of high need.

With regard to the larger set of 219 areas, both the new national data and the December 31, 1980 shortage area designation data base showed 34 cases in which the practitioner-to-population ratio at the county level did not support the area's continued designation. Further investigation, however, revealed that 33 of these 34 had been withdrawn from the list of designated areas in 1981, while only one area had been retained on the list erroneously.

In the other 185 cases, although the new national data suggested that their designations were not appropriate, the data in the December 31, 1980 shortage area data base supported their designation by showing lower values for the number of full-time-equivalent primary care physicians practicing in the county than did the 1979 national data. Furthermore, comparison with the more current shortage area data base (as of December 31, 1981) revealed that 70 of these 185 had been reviewed on a case-by-case basis during 1981--of these, 9 (or 13 percent) had been withdrawn as a result of the review, while 61 had been retained. Thus, the locally-supplied data used in the SADB which are obtained in the case-by-case reviews are believed to be more accurate and up-to-date than the 1979 national data, eliminates the findings of false positive errors in 61 cases.

This left 116 of the 219 which had not received recent case-by-case reviews and for which conflict existed between data bases as to whether the population-to-practitioner ratio justified designation. Based on the results of the case-by-case reviews described above, it was estimated that the same 13 percent of these 116 could be accepted as actual false positives, or a total of 15 areas.

An analysis was also undertaken of the second group of 38 areas that appeared to have been designated on the basis of high need indicators but where the areas' infant mortality rate (according to the new national data) was below the national mean for that indicator. Individual case review indicated that two of these designations had been withdrawn in the interim period, while 28 had been qualified by high poverty rates, a different indicator of high need. Three other areas had been updated on a case-by-case basis and their designations continued on the basis of local high needs indicators. Only the remaining five areas thus appeared to be actual false positive errors on the basis of the most current national data, data that had not yet been employed in designation review. Overall, then, there were an estimated 20 total apparent misdesignations (15 plus 5) out of the 846 whole-county designations reviewed, giving an error rate of 2.4 percent.

On balance, then, the primary medical care designations appear to be relatively accurate, given the large numbers of designations maintained. In addition, considering that designation actions are initiated or concurred in by an individuals or groups at the State or local level, rather than undertaken solely at national-level initiative, such a small proportion of errors would appear to support the general adequacy of the criteria application process. The apparent error rates of .3 percent of all counties for false negative errors and 2.4 percent of all whole-county designations for false positive errors are well below the levels which might be expected, given the number and wide variety of designations evaluated and made. (It should be noted that the possible designation errors not fully resolved by the above analysis will be referred to the State and local levels for review and will be the subject of close scrutiny in the upcoming periodic review to be conducted by the designation staff.)

Accuracy of Dental Care Shortage Areas. Unlike the primary care medical designation situation, the most recently available data on dentist location in 1979 had already been incorporated into the designation review process when the analysis was done for this report. Consequently, it was not necessary or possible to review the dental designations with independent and more recent data as was the case for primary medical care designations. The effect of this is that fewer possible errors were identified for dental designations.

Out of a total of nearly 3,100 counties, 329 possible "false negative" counties were initially identified from current national data, as compared with 599 whole-county dental shortage areas actually designated. Of these, 15 areas had been fully reviewed for designation in the interim since the data file was developed, with 12 being designated and 3 not being designated. Adequate contiguous resources which made them ineligible for designation were found in 266 areas. No identifiable reason was found for the lack of designation of the remaining 48 areas, so these were deemed "apparent" false negative misdesignations, yielding a false negative rate of 15 percent of the possible false negatives reviewed, 8.0 percent of the whole counties designated, or 1.5 percent of all counties.

The review also identified a total of 35 possible false positive errors among the 599 existing whole-county dental designations, that is, areas that were designated but did not appear to be properly so. Of these, 23 were cases where designation was entirely based upon the dentist/population availability ratio and 12 were cases where both that ratio and indicators of high need or insufficient capacity had been taken into account in the determination of designatability. An interim review by the designation staff was found to have been completed in 12 of the 23 ratio-only cases, with a finding that 8 designations maintained and 4 designations withdrawn. This left 11 possible false positives remained unexplained.

Review of the last group of 12 in which both the practitioner ratio and indicators of high need or insufficient capacity were required for designation revealed that there had been an interim designation review of

11, which resulted in designations being maintained in 7 areas and withdrawn in 4 areas. The remaining 1 area appeared to be a clear misdesignation. Overall, the net result of the analysis was to identify a total of 12 true false positive misdesignations (11 plus 1) among the 599 whole-county designations reviewed, an overall false positive rate of 2.0 percent.

In summary, the designation of areas as having dental care shortages appeared to be reasonably accurate. False negative errors were found in 1.5 percent of all whole counties and false positive errors were estimated to be 2.0 percent of all whole-county designations. (As with primary medical care designations, all possible errors not fully resolved in this review will be referred for State and local area reconsideration and closely reviewed by the designation staff.)

Case Studies of Selected Local Areas

This section summarizes the results of three case studies on the application of the HMSA designation criteria to subcounty areas.[1] A case study approach was deemed to be one feasible way to investigate sub-county designations and to obtain local views about the HMSA criteria and process in the short time available. In large part, this also reflected the fact that the inner-city and small area data necessary to conduct a more formal analysis of subcounty areas was not available. Areas believed to have some locally available small area data were selected and visited to investigate whether or not the outcomes of the designation process appeared to be consistent with their intent when viewed from a local area standpoint. The outcomes (i.e., current designation status) were compared with other indicators of shortages of medical personnel and medical underservice, computed using locally available data. Several indicators were used, including score on the Index of Medical Underservice (IMU), population-to-physician ratios, mortality rates, poverty rates, and the reapplication of HMSA criteria using current local data. The latter included an examination of the degree-of-shortage rankings for the areas.

This case study portion of the overall evaluation provides only a glimpse of HMSA-related issues in a very small number of locations. It was not a research study that used formal hypothesis development, sample selection, highly structured data collection, and statistical testing. On the other hand, it did allow broad latitude for adapting planned questions and measurements to conditions found in the field, had low implementation costs, and was able to be completed in the short time frame necessary for inclusion in this report. However, the results of the case studies do not support generalization to larger populations, as do as more formal methods, and they do not generate quantitative estimates of the effects of program changes, such as the number of additional areas which might be designated by an alternative set of criteria. Nevertheless, the case studies did explore local situations and gather some local judgments on the HMSA program, which may be of help in developing and supporting recommendations for improvements in the HMSA designation criteria.

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[1] The case studies reported here were conducted under contract by Levine Associates, Dr. Daniel Levine, Principal Investigator.

The areas selected for the case studies were those which appeared to have some local data and which exhibited characteristics that would make their study particularly relevant. Since urban areas present particularly difficult problems for designation, largely because commuting patterns make rational service areas difficult to identify, two of the three sites selected were large cities. One, New York, typifies a long established densely populated eastern metropolis with a history of having large depressed areas and a number of programs to deal with the poor and disadvantaged. The second, Los Angeles, exemplifies a newer, lower density city which has "pockets" of poverty and where travel distances are great. A rural area--West Virginia--was examined not only because of the problems unique to rural areas but also because of the importance of rural areas to the HMSA program, both historically and currently. Since many health and poverty programs have been introduced and operated in that State over the years, West Virginia also appeared to have a reasonable database and considerable experience with the HMSA program.

A total of 26 small areas were selected for analysis, including 10 each in New York and L.A. and 6 in W.Va. (See Appendix E for a listing of the areas). The small areas in New York City were "Health Districts" or major portions of such districts which, in the opinion of the Health Department, corresponded to rational health service planning and delivery areas. Similar "Health Districts" and smaller units, called "study areas," were used for the analysis in Los Angeles. The Los Angeles Health Districts are defined in much the same way as they are in New York, while the study areas portions of the Health Districts had recently been constructed to support health manpower shortage analyses for State programs. In West Virginia, insufficient data were available to support analyses of the large areas which would correspond to New York's and Los Angeles' Health Districts. As a result, the small communities of West Virginia studied were the catchment areas used for federally-funded Rural Health Initiative clinics. Overall, the analyses covered a very small portion of rural West Virginia and some 20 to 30 percent of the two large metropolitan areas.

The small area selections in all three locations, made with the advice of local officials, were designed to maximize data yield and to obtain an understanding of a wide range of relevant information. Each group of small areas represented a range of perceived underservice and, except in West Virginia, each group included both designated shortage areas and non-designated areas. Many degrees of possible shortage, different sets of economic and health circumstances, and a variety of ethnic/racial population mixes were represented.

The approach taken in each study was to: (1) collect available evidence on indicators of utilization, need, demand, unmet need, and unmet demand; (2) compare and contrast these indicators with each other and with the area's HMSA designation status and search for the reasons for any conflicts, and (3) determine the personal views of some local health leaders and practicing professionals in health departments, medical societies, Health Systems Agencies, schools and clinics with respect to possible changes in the designation criteria which might be both desirable and feasible from their personnel viewpoint.

Although caution should be taken in making generalized conclusions from these case studies, a number of findings and hypotheses were drawn from the results of the case studies, some of which reinforce those from analyses reported in other chapters of this report. (A more detailed description of the findings of the case studies is presented in Appendix E.) These relate to three general issues that confront development and use of any criteria for designation of manpower shortage areas. The first issue concerns the availability and quality of data and the potential for and cost of collecting more data. The second concerns the appropriateness of particular criteria and the uniformity of their application. The third concerns the broader causes of shortages and the appropriateness of the criteria in identifying them.

A largely mistaken hypothesis underlying the mounting of the case study was that local officials and planners could be expected to have more relevant data than officials at other levels, including the national level. While this may be correct in some instances, the case studies indicated that local officials are also faced with severe data constraints. Of all the measures developed by the research team prior to the site visits, only a few were available and feasible to collect in time for the report. The types of data usually available locally were overall population counts, physician and other health provider counts, and some vital statistics such as mortality and fertility rates. Socio-demographic data such as the percent of the population below poverty and age and sex of the population were available but seriously dated. (This situation should be remedied, at least in part and for a time, when the 1980 census data become available.) Information on demand, detailed travel patterns, detailed "needs" indicators, or utilization were usually not available and, when they were, were extremely limited. Even those data that were available varied substantially in quality and reliability. Local planners also generally relied on secondary sources for physician counts, and detailed breakdowns by the amount of primary care a physician provides or by full time equivalency were not possible to develop without very expensive local surveys, which, if undertaken, likely would differ significantly between areas. Furthermore, specific area adjustments of head counts were shown to often be based on subjective local factors, such as an area's desire to be designated or a single individual's definition of primary care, as much as they are on objective information.

Various reservations were expressed by local officials regarding the appropriateness and uniformity of application of the current HMSA designation criteria. One of the most widely sought improvements was a more consistent definition of "rational service area." Currently, according to these officals, areas that apply for designation largely make their own interpretation of a "rational service area," which leads to widely varying results. Adjustments to population and physician counts were also viewed as inconsistent between areas because of the inadequacy of the basic data and the varying definitions of primary care and full-time equivalency. Many interviewees thought the criteria for contiguous area requirements were unnecessary and not feasible to measure with current data. Finally, there was frequent mention of the need to develop a better method of assigning a degree-of-shortage priority to designated areas, one which would relate to opportunities for an effective practice in the areas.

The final issue seen was that relating to the complexity of designating areas as having shortages when there were clearly appeared to be different kinds of shortage. If different concepts of "shortage" conflict, as they frequently do, it is unlikely that any one set of criteria would be sufficient to identify them all satisfactorily; for example, the HMSA criteria, based largely on manpower availability, will not necessarily identify high "needs" or high "demand" areas. The evidence from the case studies appeared to confirm this. Accuracy of data aside, little consistency was exhibited between the HMSA designation status of an area and indicators of need, such as its IMU score or its mortality and fertility rates. Many interviewees believed that a more integrated approach to solving the problems of these areas, one that would integrate manpower with other remedies, would yield better results than an approach relating to manpower programs alone. (See Appendix E for a fuller discussion of the case study findings).

CHAPTER V

TECHNICAL ASSESSMENT OF INDICATORS AND CUT-OFF LEVELS USED IN THE PRESENT DESIGNATION CRITERIA

This chapter examines and assesses the many technical aspects of the current designation criteria. It examines each of the major criteria and addresses their appropriateness, usefulness and technical accuracy, attempting particularly to determine whether they reasonably address the underlying objectives of the HMSA designation. As indicated earlier, the current HMSA designation criteria essentially measure an "availability" concept of shortage, with adjustments made for problems of access, high levels of unmet need and insufficient capacity. The discussion presented here is directed toward assessing the effectiveness of the criteria in addressing these concepts.

Much of the technical accuracy of the HMSA designation process depends upon developing correct population and practitioner counts within an appropriate ("rational") service area. These issues will be dealt with first. This is followed by consideration of the general "cut-off" levels of practitioner availability, i.e., the practitioner/population ratios used in the criteria. Finally, the adjustments for high levels of unmet need and insufficient capacity and the "cut-off" points, or threshold levels, at which they take effect will be examined.[1]

Determination of a Rational Service Area

The first requirement of Section 332 of P.L. 94-484 is that a health manpower shortage area should be a "rational area for the delivery of health services." Ideally, in such a service area all of the care provided by its practitioners would be obtained by patients living within the same geographic area. Measures of care availability would thus be uncontaminated by what is referred to as "border-crossing." In actuality, few areas approach this ideal, even for primary care which tends to be more locally obtained than other health services. The current designation criteria generally define a service area for primary care to include all those primary care providers within 30 minutes travel time of the population center of the area. In addition, there is consideration of whether the area--which may be either a whole county or part of a county--is rational, i.e. has not been artificially constructed to meet the requirements for designation, but has some other local basis for acceptance, reflecting factors such as topographic constraints, highway location, and patterns of travel to obtain services. For the most part, the national-level review of the rationality of an area definition can only consider compactness, roads, natural barriers, socio-demographic and language barriers and similar isolating features, and the bulk of the burden for proper determination of what is a rational service area rests with the local applicants and the State and local area reviewers.

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[1] Much of the supporting information in this Chapter was developed under contract by La Jolla Management Corporation.

In a related part of the designation procedure, areas contiguous to the proposed service area also are examined to determine if they have a more than adequate supply of practitioners and therefore might be able to provide care to the residents of the area under consideration. More specifically, a population/primary care physician ratio of 2000 to 1 or better in a contiguous county is considered to indicate that the county can meet its own physician needs and also serve the area in question as a resource for primary medical care. The resources of the contiguous county would thus be considered in determining the availability of resources to the county proposed for designation, unless travel to it required more than a 30 minute one-way trip because of distances, roads, and natural barriers. These same considerations are used to consider subcounty areas proposed for designation by an applicant. Two major features of the rational service area definition--the travel-time standard and the question of appropriateness of the county as a unit of analysis--are assessed here.

Travel-time as a Measure of Availability. One of the basic premises of the HMSA program is that persons in areas where few providers are located are less likely to receive adequate care. If people could easily travel to areas where providers are located and if sufficient capacity were available then such a HMSA program would not be necessary. However, the mere availability of providers is no guarantee that care is available. In some cases providers may not accept certain patients, such as those who cannot pay for care. For example, only about half of the Medicare claims are accepted under assignment, and the added payments that other physicians charge Medicare patients may inhibit utilization.

In non-metropolitan areas, too, persons tend to consume fewer services even though they are in poorer health; for example, preventable deaths, such as those due to cervical cancer and accidents, as well as infant mortality are substantially higher in rural areas.[2] It is generally believed that the lack of physicians in an area may inhibit care seeking behavior, but other factors are relevant as well.

The evidence regarding the effect of travel time and costs on the utilization of physician services is mixed. Travel time in itself may also not be particularly meaningful for a number of reasons. There is no clear relationship between travel time and cost. Individuals place different values on their time, and trips for health services may be combined with other activities. Travel to specialists may take longer since they are not as widely dispersed as primary care physicians, and longer travel time may reflect a higher level of illness in the patient.

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[2] Kleinman, J. "Medical Care Use in Nonmetropolitan Areas" Health United States 1981, pp. 55-61.

Thus, it is not surprising that the expected negative relationship between utilization and travel time was not found in a recent study of the National Medical Care Expenditure Survey data for 1977.[3] Travel time also appears to be only weakly correlated with physician density. Congestion in urban areas may actually make physicians less accessible than in many rural areas.

The literature contains travel time standards for various types of medical care. There seems to be a general consensus that travel time greater than 30 minutes is not desirable, but this conclusion is almost entirely based on expert opinion. The 30-minute travel time standard as a measure of appropriate physical accessibility of care was selected on the basis of several published studies [4]. Recently, however, new data have become available which permit direct assessment of the distribution of travel times to physician offices. The 1978 NCHS National Health Interview Survey (NHIS) contained a question on the amount of time the respondent spent traveling to the physician's office. Summary data on the distributions of patients' travel times to physicians in all specialties and to primary care physicians only are as follows:

	One-way Travel Time to the Physician	
Distribution	All Physicians	Primary Care Physicians
50th Percentile	14.4 minutes	14.0 minutes
75th Percentile	25.7 "	22.8 "
90th Percentile	40.6 "	36.5 "
Mean	21.1 minutes	19.1 minutes

These data show that over three-fourths of all patients traveled less than 30 minutes to the offices both of physicians generally and primary care physicians in particular. The travel times to primary care physicians, however, were somewhat less than for all physicians. Although data are not available by area type for travel to primary care physicians, the available data show the following distribution of travel times to all physicians by area type.

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[3] Wilensky, G., Rossiter, L. and Taylor, A. "The Role of Money and Time in the Demand for Medical Care," December, 1981.

[4] A good review of such studies is contained in the Report of the Graduate Medical Education National Advisory Committee to the Secretary, Department of Health and Human Services, Volume III, Geographic Distribution Technical Panel, DHHS Publication No. HRA 81-653. See also: Shannon, G.W., Bashshur, R.L., and Metzner, C.A., "The concept of distance as a factor in accessibility of health care, in Med. Care Rev. 26:143, 1969; Wisconsin Governor's Health Planning and Policy Task Force, Final Report, Madison, Wisconsin, 1972; Commonwealth of Pennsylvania Department of Health, "1975 Public Hearings on Critical Health Issues Towards Development of a State Comprehensive Health Plan," State Advisory Council on Comprehensive Health Planning, Harrisburg, Pennsylvania, 1975; and Bosanac, E.M., Parkinson, M.A., and Hall, D.S., "Geographic Access to hospital care: A 30-minutes travel time standard," in Med. Care 14:616, 1976.

	Distribution of One-way Travel Times to All Physicians			
Area Type	50th Percentile	75th Percentile	90th Percentile	Mean
Metropolitan Areas				
Central City	14.5 minutes	23.9 minutes	38.9 minutes	20.0 minutes
Not Central City	14.3 "	24.3 "	36.5 "	19.6 "
Nonmetropolitan Areas				
Nonfarm	14.3 "	27.4 "	50.4 "	23.8 "
Farm	19.8 "	30.8 "	52.2 "	27.3 "

With allowance for a presumably shorter travel-time for primary care physician visits, it can be safely assumed that over 75 percent of primary care visits in all types of areas require less than 30 minutes and that nearly 90 percent of these visits take less than 30 minutes in urban areas. Thus, the current 30-minute standard appears appropriate for metropolitan areas, in that it excludes only about 10 percent of the population traveling unusual distances.

Travel times for the least-favored nonmetropolitan residents, however, would appear to be distinctly greater than for the rest of the population, approaching 50 minutes at the 90th percentile. The appropriateness of the 30-minute standard for rural areas is thus a little less clear. However, in rural areas the population has longer travel times to obtain all goods and services, and although there clearly are disadvantages to this, many such residents have made such an area choice consciously based on other advantages of living outside of metropolitan areas. On the other hand, length of travel appears to lower utilization of health services. Thus, it would probably not be appropriate to set a markedly greater travel time standard for nonmetropolitan residents, since a corrollary of the underlying program goals to improve access and availability is to prevent barriers of this type from having such an effect. Consequently, a 30-minute standard for travel to primary care in both urban and rural areas seems reasonable.

The corresponding travel-time standard for dental care is 40 minutes, reflecting both the results of a 1967 study 5/ and the lesser frequency and urgency often associated with dental care. This standard continues to appear subjectively reasonable, and no objective data exist which would support changing it.

5/ According to the study "Public Acceptance of Prepaid Group Practices," School of Public Health, University of Michigan, Ann Arbor, Michigan, 1967. 92 percent of all dental patients travel less than 40 minutes (one way) to their dentist.

Use of the County as the Primary Analytic Unit. A majority of the areas designated as shortage areas are whole counties. The common acceptance of the county as an appropriate unit of analysis, except where there is a clear indication it is inappropriate, is based largely on two factors: 1) the assumption that primary care should be in relatively close proximity to the population; and 2) the fact that the county is the smallest geographic area for which most relevant statistics are widely available (on a fairly current basis). Use of the county as the analytic unit for HMSA purposes is based upon the further presumption that most care is normally obtained within the county.

Progress has been made recently in defining patient travel patterns which shed new light on this subject, largely through preliminary analyses of the 1978 National Health Interview Survey (NHIS) and the 1979 Physician Capacity Utilization Survey conducted by Mathematica Policy Research.

NHIS data on the county of residence and the counties where physician and hospital care were received permit establishment of patient travel patterns for a large nationwide sample of households in 1978. Kleinman and Makuc have observed a general pattern of travel for care from rural to urban areas; 91 percent of all physician visits (excluding telephone and home visits) occurred within the same county in large metropolitan counties, while only 48 percent of all physician visits occurred in the same county in totally rural counties outside SMSAs.[6] In nonmetropolitan areas, however, most border crossing occurs between adjacent nonmetropolitan counties, and only 13 percent of the visits to other counties were to metropolitan ones. Thus 87 percent of the visits by residents of nonmetropolitan counties occurred in nonmetropolitan counties. By way of contrast, travel by metropolitan area residents to nonmetropolitan counties occured in only 2 percent of the visits. Only 8.5 percent of the residents of nonmetropolitan counties that reported a usual source of care did so in a metropolitan county.

The extent to which border crossing in nonmetropolitan counties tends to cancel out is unknown at the present time. If, for example, consumers in two adjacent counties cross the county boundary because of preferences for particular physicians then the population-to-physician ratio for each county may still be a reasonable measure even if substantial patient travel occurs. Some border crossing would also be consistent with the hypothesis that consumers tend to minimize travel costs. Consumers located near the edge of a county may actually be closer to a source of care in an adjacent county than to one in their own county.

Several methods have been used to create larger market areas than the county. Some rely on patterns of overall economic activity (State Economic Areas, BEA Economic Areas, Rand McNally Trading Areas) to generate county groups. However, the average person has only about four physician visits per year, and it is not clear how closely travel for health services follows the patterns of other consumer purchases. Thus it is important to consider other methods of creating county groups more closely related to the utilization of health care services. For example, Transaction Systems, Inc., used a combination of three types of consumer travel patterns to generate county groups.[7] These are: (1) employment commuting patterns, (2) natality travel (county of residence vs. county of childbirth), and (3) mortality- travel (county of residence vs. county where death occurs). Research is underway at NCHS to determine whether physician services utilization rates adjusted for consumer characteristics are influenced by the availability of physicians using these county group as the market area.

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[6] Kleinman, J. and Makuc, D. "Travel for Ambulatory Medical Care," Medical Care Fall 1982 (forthcoming).

Anderson did not create county groups, but provided a methodology for verifying whether any area at the zip code level or above is a reasonable area for use of health services. Applying this method to hospital services in Health Systems Areas (HSAs), Anderson computed the ratio of total hospitalization charges of Medicare patients residing in the HSA to the total charges of patients receiving care within the HSA. A ratio higher than 1.0 implied that patients migrated to other HSAs for care. Ratios below 1.0 indicated that the HSA was drawing patients from a wider area. Most HSA's were found to have ratios near one, indicating that there is not a great deal of patient travel across HSA boundaries. Most major cities had ratios of .96 to .99 which indicates that the large number of hospital patients within an area dominates the migration into the area.[8] This method could be applied to other areas and to physician services. It is likely to be valid since there is no reason to believe that Medicare patient travel is significantly different from that of the rest of the population.

Using data from the 1979 Physician Capacity Utilization Survey, which indicated the counties where patients of the physician lived, nearly 600 market areas were constructed for physician services in nonmetropolitan areas after analysis of the individual physician responses.[9] The analysis showed significant travel between counties in nonmetropolitan areas, supporting the travel patterns observed in the 1978 NHIS. The market areas tended to be fairly large, containing an average of 3.6 counties with 52 primary care physicians serving 133,300 persons, and a mean patient travel time, as reported by physicians, of 19.5 minutes.

Whether or not the county can be considered to be a rational service area depends to a large extent on individual judgment. The majority of physician visits occur within the same county, but significant patient travel exists between counties. If one selects some arbitrary standard, such as that two thirds of all physician visits should occur within the same county, then almost all of the metropolitan counties and many of the nonmetropolitan counties would qualify as rational service areas. On the other hand, the more rural counties in nonmetropolitan areas would not qualify. Moreover, this conclusion would vary considerably across regions because counties vary greatly in size. Research at ODAM using the 1978 NHIS data indicates that border crossing is much lower in the West (where counties are larger) than it is in the South.

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[7] Transaction Systems, Inc. Descriptive Report on "Evaluation of Alternative Health Area Definition Methods", November 15, 1976 (Contract No. HRA 230-75-0080).

[8] The Boston area was found to be an exception, with a ratio of .69. Approximately 8 percent of difference between Boston and the national average is due to more severely ill hospital patients and 25 percent is due to more people being treated in Boston hospitals than reside in the area.

[9] Kehrer, B. and Sloan, F. Delivery of Primary Medical Care in Nonmetropolitan Areas: Impact of the NHSC. DHPA 15-82-1.

On balance, the county is likely to represent a reasonable rational service area in many instances, although some system of county groups may be an even better measure for non-metropolitan areas. In the most rural parts of the U.S., particularly in areas where counties are small, it is necessary to group counties to obtain reasonable service areas. However, this conclusion is based on travel patterns observed in 1978. To the extent that diffusion of physicians into rural areas is occurring, the situation may change. Further research in this area is therefore highly desirable.

Determination of the Appropriate Population

Although detailed, accurate data are available only every 10 years from the Decennial Census, the annual estimates for county populations provided by the Bureau of the Census usually are satisfactory. For subcounty areas, or in instances where there is agreement on alternate, local or State estimates of county population levels, locally prepared estimates are employed. In both instances national data exist to provide a basis for review. The current criteria, however, adjust for the higher utilization of some population age groups, and/or the presence of temporary populations in the service area. These adjustments are discussed below.

Population Age/Sex Utilization Adjustments. The first adjustment to the population estimates is for differences in care utilization between different age and sex groups of a given population. This is done to allow for the higher utilization requirement of an area that has unusually large proportions of aged and young persons. The present criteria multiply 12 age/sex specific utilization rates (from the Health Interview Survey) by the estimates of the appropriate populations, and divide the total weighted utilization by the national average utilization to obtain an inflation factor.

Except when decennial Census data are current, estimates of an area's age-sex population distribution are not generally available and must be provided from local estimates. Because many areas do not normally estimate the population distribution over age groups by sex, these estimates can be difficult to prepare and review at State, local, and national level, although data from a preceeding decennial Census provides a benchmark measure. In addition, there is little variation among areas in the proportion of the population by sex, and only the under five and 65 and older age groups have utilization rates markedly different from the other age groups. The above considerations raise questions about the accuracy of the criteria's measurement and the burden on applicants and reviewers of the use of such a measure.

Two other issues related to this adjustment need to be considered. Present criteria use age-sex utilization rates for all types of physicians, whereas actual designations are made only for primary medical care. Statistical analyses show significant differences between the age-sex utilization rates for primary care physicians only and for all physicians. Because of this, it would appear to be more appropriate to employ the primary care only rates when the utilization rates are revised to reflect more current Health Interview Survey data.

The other issue is whether the adjustments are significant enough to be warranted at all, as designation experience appears to show only marginal impact from the adjustment and little use by applicants. To verify that the impact was indeed small, rank-order correlations were prepared for all U.S. counties, comparing the unadjusted to the adjusted populations using current criteria methods. The rank-order correlation coefficient was .99--which indicates very minimal effects of this adjustment on the overall rank-orderings of counties. On the other hand, the adjustment in a few of the more extreme cases ranged from 5 percent to as much as 15 percent, which could affect a designation decision. Thus, the important question for these utilization adjustments to the population is whether they should be simplified or are significant enough to retain at all.

Temporary Populations. Three types of adjustments for temporary populations are made in the criteria--for seasonal resident populations, for tourist populations, and for migrant worker populations. Seasonal residents and migrant populations are included in the population count in proportion to the fraction of the year they are present in the area. Tourists are included on the basis of one-fourth of the estimated number of person-years which tourists add to the population. Areas sharply affected by temporary populations normally provide estimates of their numbers and, with State and local level review, these estimates are thought to be reasonably accurate.

No empirical measures exist by which to assess the criteria's assumptions as to health care utilization by these temporary populations, but they appear reasonable and have been generally supported by the information provided by local areas where these types of populations are present.

A separate issue is how these temporary populations should be considered in an area's population count. The requirement for primary care in an area can be seen as related to the population typically present in the area or to the peak population, depending upon which is seen as the more appropriate basis. In the current HMSA approach, the total reference population includes adjustments for the temporary population proportional to the time they spend in an area. Adjustments for tourist populations have not often been found to be of significance, seldom exceeding a 2 to 3 percent adjustment to the base population. Seasonal resident and migratory worker adjustments, in contrast, can result in a doubling of the base population. However, the current temporary population adjustment results essentially in an "average" population, which tends to underestimate physician availability during much of the year and to overestimate physician availability during the peak periods of temporary populations. Where temporary populations have a significant impact over a period of less than six months, such as a resort area where the population may triple for a four-month season, it is questionable whether a weighted average measures appropriately practitioner availability for either the permanent or temporary populations. Accordingly, an issue for temporary population adjustments is whether the base, peak, or weighted average population is the appropriate measure for determining the area's primary care practitioner availability.

Determination of the Appropriate Number of Practitioners

One of the most critical elements in the HMSA criteria is the determination of the appropriate number of practitioners to be used for measuring their availability to a population. Although available data are obtained by the HMSA staff from professional associations or from special Federal surveys, the data are often several years old and generally do not go below the county level. However, current local estimates are usually provided as part of the application for designation and these estimates are reviewed at the Health Systems Agency, State, and national levels, and by the appropriate State or county professional associations. Thus, it is generally possible to identify adequately the number of full-time-equivalent practitioners providing care in a particular area.

Still, a number of issues related to estimating the practitioner supply remain. In the case of physicians, the issues cluster into four major topics: 1) The specialties appropriate for inclusion in the primary care counts; 2) The question of the inclusion of nurse practitioners and physician assistants, 3) Adjustments for hospital-related care, and 4) Adjustments for age and specialty differences in visit productivity. These physician-related issues will be dealt with first, in the above order, followed by consideration of the dentist-related issues.

Physician Issues

Primary Care Specialties. While there appears to be a limited degree of consensus as to the medical specialties deemed to provide primary care, and this definition has been widely used for several years, other definitions are sometimes used for specific purposes. In the present designation criteria's calculation of the population-to-physician ratio, only non-Federal doctors of medicine (MD) and doctors of osteopathy (DO) providing direct patient care who practice principally in one of four primary care specialties--general or family practice, general internal medicine, pediatrics, and obstetrics and gynecology--are counted.

Some authorities, however, state that not all physicians in these four specialties provide primary care and/or that physicians in other specialties also provide some primary care. Specifically, questions are raised as to the inclusion of OB/GYN and the exclusion of general surgeons, particularly in rural areas where they play a greater role in providing primary care. Others feel that all physicians who operate largely on a referral basis should be excluded, such as subspecializing internal medicine MDs. Another aspect of this issue is the difference between the categories of physicians included in the definition of primary care as specified in the law for certain programs authorized by the Health

Professions Educational Assistance Act of 1976, which refers only to GP/FP, general internal medicine, and pediatrics, and the categories used to define primary care physicians for designation of shortage areas, (authorized by the same legislation) which are aimed predominantly at the program needs of the NHSC.

Two quite different types of information may be useful in illuminating these issues. Medical Practice in the United States summarizes the results of the National Study of Medical and Surgical Specialties conducted at the University of Southern California School of Medicine by Robert C. Mendenhall. The report includes data on the percentage of encounters referred by each specialty to other specialties. These data were analyzed from the perspective that patients are most often "referred" to other physicians if they need specialty care rather than primary care. Thus, a physician most of whose patients are mostly referals can be considered to be providing specialty rather than primary care. Another type of information from this source is the measure of the proportion of visits in which the care provided was part of the provision of "principal care" to the patient--i.e., where the physician served as the patient's main care source. The following presents the average percentage of visits for principal care and the average percentage of patients referred into practices of physicians in several specialties:

Specialty	Percentage of visits for principal care	Percentage of referred patients
General Practice	80.1	6.1
Family Practice	77.7	8.0
Pediatrics	72.3	12.8
Obstetrics/Gynecology	65.0	17.7
Internal Medicine	61.9	31.7
General Surgery	29.8	61.3
Dermatology	16.7	29.9
Ophthalmology	41.6	23.0

Similar to general and family practice, these statistics show that pediatrics and obstetrics and gynecology have quite low referral rates. In contrast, internal medicine has a quite different intermediate referral rate and general surgery is shown to have a high referral rate. All of the specialties now defined as the primary care specialties in the HMSA criteria have high proportions (greater than 60 percent) of visits involving principal care. In contrast, less than 30 percent of general surgery visits involved principal care. Also noteworthy is the fact that a number of other medical subspecialties had only slightly lower proportions of principal care. Proportions of over 65 percent principal care visits were reported for nephrology and medical oncology; proportions of over 50 percent principal care visits for cardiology, hematology, and rheumalogy; and proportions of over 40 percent for gastroenterology, pulmonary diseases, and endocrinology.

The second type of information comes from, among others, the Lawlor and Reid study, Hierarchical Patterns in the Location of Physician Specialists Among Counties, which identified a pattern in the order of appearance of MD specialties in counties. The hierarchical order identified by county size is most pertinent to the order of appearance of medical specialists in progressively less rural areas rather than in sub-county metropolitan areas. The study found that general surgeons are usually the second specialty to appear in rural counties, followed by internal medicine, while OB/GYN and pediatric specialists normally appear only after a surgical specialist is present and in counties that typically have much larger populations. The table below shows the order of appearance and mean populations for counties having the indicated specialty and all lower order specialties (and not having any higher order specialty):

Highest Order Specialty Present	Number of Counties at the Indicated Level	Mean County Population
No Physicians	175	4,317
General/Family Practitioner	792	10,927
General Surgeon	328	17,795
Internist	104	23,643
Other Surgical Specialist	50	31,600
OB/GYN Specialist	44	34,391
Pediatrician	156	51,382
Other Medical Specialist	738	230,737
Counties not conforming to the Hierarchical Pattern	691	25,140

Considering the cumulative evidence of the two studies mentioned above, the general and family practice specialties obviously provide primary care. From the Mendenhall study, it appears reasonable to conclude that internal medicine, pediatrics and obstetrics/gynecology should also be retained in the definition of primary care for designation purposes. The evidence concerning general surgery is mixed. General surgeons may well have a considerable primary care role in quite rural areas that have few other specialties present, while general surgeons in more urban areas may be highly referral-oriented specialists. There is also some concern that primary care provided by general surgeons may not be as appropriate as that provided by family practitioners, internists and pediatricians.

The high proportion of principal care provided by medical subspecialists is explainable. Patients under treatment for these conditions are frequently undergoing complex and delicate therapies such that any other care provided should only be given by a physician fully aware of all aspects of their condition and therapeutic regime. Consequently, it is quite reasonable for these specialists to provide primary care for many of those patients being treated within their specialty. The exclusion of these specialists' primary care provision probably overstates slightly the population which needs to obtain primary care from normal sources. But their inclusion would require considerable further study to determine the amounts of primary care they typically provide and some basis on which to adjust for the proportions of patients within and without the area being considered. Conversely, the exclusion of the primary care contribution of these specialists probably creates few serious problems because of the relatively small numbers of physicians and patients concerned.

Further clarification or resolution of the above issues is beyond the scope of the review undertaken for this report. The practical difficulties raised by differentiation of the type of care provided within a specific specialty and/or by a specific physician would appear to be nearly insurmountable for designating areas on this basis. It would be particularly difficult to establish appropriate ratio cut-offs if additional specialists were to be taken into account on a partial basis, largely because of data constraints and definitional problems, wide differences among areas, and lack of concensus on specialty "shortage" levels. Furthermore, counting the fractional number of physicians and/or other practitioners to be included in any such revised definition would be tremendously difficult and resource-intensive, and would pose a significant burden to local applicants and reviewers.

Inclusion of Nurse Practitioners and Physician Assistants. A related definitional question is the degree to which nurse practitioners and physician assistants should be included in the estimates of primary medical care practitioners. Numerous studies document the contributions of these providers to the productivity of medical practices, and there is general recognition that a physician working with a nurse practitioner or physician assistant can be up to one- and one-half times as productive as a similar physician working alone. Despite this, there are significant drawbacks to including these personnel in the definition of primary medical care practitioners. The Rural Health Clinic Services Act limits Medicare and Medicaid reimbursement of services provided by nurse practitioners and physician assistants to those rendered in clinics located in rural areas which have been designated as health manpower shortage areas or medically underserved areas. Inclusion of the services of such personnel in identifying shortage areas could prevent some otherwise designatable areas from being designated, thus preventing reimbursement for such services and in turn decreasing the availability and accessibility of such services, contrary to the goals of both the designation effort and the Rural Health Clinics Act. Even if there were a resolution of this dilemma, however, it is unclear whether adequate data on assistants and nurse practitioners are available locally and whether a firm national basis exists for evaluating such local area data for the NP/PA contribution in that area.

Adjustments for Hospital-related care. The contribution of practitioners in the hospital setting to the availability of primary medical care services to an area has never been clearly identified, nor have the issues associated with its measurement been satisfactorily resolved. Hospital inpatient care and emergency care are generally not deemed to represent primary care, although some outpatient care and all of the care provided by hospital-related primary care clinics are. However, quantitative measurements of these services by geographic area and specific hospitals and their translation into full-time-equivalent physicians is difficult.

The current HMSA criteria count staff physicians in outpatient clinics and in primary care clinics on an estimated full-time equivalent basis. By contrast, hospital residents in training in the primary care specialties are counted as 0.1 full-time equivalent practitioners. This relatively low FTE count for residents appears to be in line with the views presented in the reports of the Graduate Medical Education National Advisory Committee. Emergency room staff are excluded from consideration, because this setting is deemed inappropriate for primary care, even though significant segments of the population in some areas obtain most of their ambulatory care in hospital emergency rooms.

Adjustments for hospital staff physician engaged in outpatient activities or working in primary care clinics present a significant data problem. Local applicants for HMSA designation have to make estimates of physician hours spent in these primary care activities, and there must be a reasonable basis for local, State, and national validation. As difficult as any nationally-determined adjustment may be, the data problems in particular hospitals and areas compound the problem. Fortunately, data newly available may soon permit development of an alternate approach to these issues. The American Hospital Association (AHA) has recently begun publishing annual data on the types, location, and utilization of hospital-related clinics. Thus, if new analytical efforts are undertaken, it may be possible to exclude hospital physicians from the primary care counts and instead include only the full-time physician equivalent of the care provided in appropriate clinics by dividing clinic visits by some measure of the annual visit productivity of physicians. However, while these new AHA Annual Survey data indicate whether a hospital provides any of 32 types of outpatient services, the AHA categorizes these services only into "emergency" and "other" encounters in their data on number of visits. To make the needed primary care estimates, a determination of which types of outpatient services should be considered within the scope of primary care would first be needed, one that clearly addressed various, non-specific disease categories (such as "diabetes" and "ear, nose, throat)." On the other hand, outpatient services in categories such as "obstetrics" and "pediatrics, general," would more clearly represent primary care. With agreed-upon definitions, it might be possible for a local applicant or organization to develop an estimate of the visit volume for the included primary care services, rather than to estimate full-time equivalency of hospital-based physicians in such activities. In this way, the measurement of hospital-based primary care services could be significantly improved.

Adjustment for the primary care services provided by hospital residents continue to present significant problems. There is little sound basis for estimating that any set proportion of a resident's time in all cases is devoted to the provision of primary care; utilization of any single proportion would likely be inaccurate for a particular area, hospital, or resident under consideration.

Measurement of the proportion of primary care content of services provided in emergency room services also remains a serious problem. Including emergency room services quantitatively in the HMSA primary care services measurement would clearly incorporate considerably more than primary care services. Their continued exclusion, on the other hand, would probably represent a systematic underestimate of the primary care services being provided in inner-city and other areas where residents typically use emergency rooms as the first-contact point for many non-emergency conditions. Continued exclusion of physician hours in what is largely viewed as an inappropriate setting for primary care may be acceptable if it is assumed that such utilization results from a shortage of more appropriate primary care physicians, and that an increased availability of primary care physicians would end the reliance on emergency rooms; however. this remains a somewhat doubtful assumption.

In some rural areas, hospitals and their emergency rooms are explicitly organized and generally recognized as being the focus of primary as well as all other care, because this is the most efficient arrangement for the particular area's situation. Yet, in many rural areas where only primary care physicians are available, they largely provide primary care out of necessity. At the present time this issue does not appear to be now resolvable; further examination of empirical evidence will be required before any satisfactory adjustment for primary care provided in emergency rooms can be developed.

Productivity Differences of Physicians by Age. Numerous questions have been raised as to whether adjustments for the visit productivity of physicians based upon their age and specialty are appropriate. The current HMSA criteria do not adjust for either eventuality, although case-by-case adjustments are made for the productivity of specific physicians who are semi-retired.

With regard to the issue of making systematic, generalized adjustments for variations in physician productivity, the question is whether the numbers of patient visits provided by physicians of different ages vary significantly enough to require trying to allow for them, and consistently enough to warrant an automatic adjustment to take these differences into account in the criteria. Although relevant data are not available for recent years, data on the mean number of hours of direct patient care by physician age and specialty for 1978 show little variation, as shown in the table below. In addition, there seems to be little rationale for interpretating what these differences mean.

Weekly hours of direct patient care

Specialty	High/Low range for physician age groups under age 61	Physicians 61 Years of Age and older
General/family practice	50.5/47.6	39.6
Internal Medicine	51.5/49.2	39.9
Pediatrics	47.0/45.6[1]	39.7
OB/GYN	50.5/49.4	33.6

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[1] These data exclude the "35 and under" estimate of 41.1 hours of direct patient care; this is believe to be an abberant figure as compared to other estimates.

Source: AMA, Profile of Medical Practice, 1979, Table 25 (p. 212)

The table above clearly shows that there are minimal variations in MD work-hours and, thus, probably in patient visits, until physicians older than 60 are considered. Since partial retirement is adjusted for in estimating the numbers of practitioners already included in the criteria, additional adjustment for age differences in productivity would appear to be of little consequence or value.

Productivity Differences by Specialty. Turning to the question of whether there should be an adjustment for visit productivity differences between the various specialties included in primary care, the issue of the effectiveness of any such adjustment is clouded by a second issue of how the output of these specialties should properly be compared. Analysts at the American Medical Association (AMA) have shown that differences in specialty distribution among areas make a significant difference in the number of patient visits provided in those areas. On this basis, the AMA Center for Health Services Research recommended several years ago that adjustments be made for such specialty differences. When office hours of patient care per week are considered, however, the differences are much less considerable than for the measure of patient visits, as is shown below:

	Measures of office-based patient care provided, 1980			
	All areas		Nonmetropolitan Areas	
Specialty	Hours/week	Patient visits/week	Hours/week	Patient visits/week
General/Family Practice	33.8	116.5	35.7	133.5
Internal Medicine	27.9	66.3	30.1	85.6
Pediatrics	35.2	125.2	35.3	132.7
OB/GYN	28.9	96.4	30.2	108.6

Source: AMA, Profile of Medical Practice, 1981, Tables 12 and 19 (pp. 154 and 161).

Differences among specialties in the hours of care they provide are no more than 20 percent in nonmetropolitan areas, which are more akin to shortage areas than are the national averages. In contrast, there was more than a 50 percent difference in overall numbers of visits. It is well recognized that the average length of visit to different specialists varies considerably, and it is commonly accepted that these difference generally reflect differences in the amount and type of care provided in the visit. Accordingly, it does not appear completely reasonable to assume that raw numbers of visits necessarily reflect appropriately the amount of primary care provided and, hence, the availability of primary care physicians. In addition, a statistical analysis of county physician-population ratios was compared to the same ratios adjusted for differences in the annual patient care office hours found no appreciable differences in their rankings, with the rank order correlation coefficient being greater than .99. Thus, it does not appear that such a specialty adjustment would be particularly meaningful.

Dentist Issues

Determination of the Numbers of Dentists.

Determination of the appropriate number of dental practitioners for estimation of their availability raises a number of questions which can be grouped into three clusters: 1) The extent to which dental specialists should be included; 2) The need for adjustments for the care provision in dental school clinics; and 3) The need for adjustment for productivity differences by age and employment of dental auxiliaries.

Inclusion of Dental Specialists. The current HMSA criteria count all dentists "except in those areas where it is shown that specialty dentists (not in general practice or in pediodontics) are serving a larger area and not addressing the general dental care needs of the area being considered for designation." This standard is somewhat different than the standard for physicians, and reflects the assumption that nearly all dentists provide an appreciable amount of general care. Unlike physicians, all dentists are fully trained for the provision of general (primary care) dentistry.

Upon review, however, the issue appears less clear. To assess this criterion, the 1979 Survey of Dental Practice recently published by the American Dental Association (ADA), was examined. This report includes data on the percentage of encounters referred into practices by dentist specialty. These data were analyzed from the perspective that patients are "referred" to other dentists if they need specialty rather than primary dental care. Thus, a dentist whose patients are mostly referred may be considered to be providing specialty rather than primary care.

The following are the values for the percentage of patients referred into practices of dentists by specialty:

Specialty	Percentage of Patients Referred into Practice
General Practice	12.6
Pedodonists	30.7
Prosthodontists	45.0
Orthodonists	67.4
Oral Surgeon	73.8
Periodontists	91.5
Endodontists	95.0

As may be seen from the above data, there is substantial variation across dental specialties in the percentage of patients referred. General practice dentists and pedodontists clearly fall within the general dental care definition. With the possible exception of prosthodontists, all of the other specialties have high referral rates which suggest that they may not fit the definition of general dental care any more than many medical specialists fit the definition of primary medical care. In the case of prosthodontists, many of these specialists provide general dental care to persons with dentures, while they also function as specialists on referral for the fitting of appliances. Accordingly, both general practice and pedodontic dentists should clearly be counted in establishing the availability of general dental care, while consideration should be given to counting prosthodontists on a one-half full-time equivalent basis.

Dental School Clinic Care Provision. Little attention has been paid to adjusting dentist availability for the presence of a dental school with a clinic in the area. Although such clinics may indeed provide primary care, this care is provided not by licensed dentists but by students; the scope of services provided is determined not by patient dental needs but by teaching needs; and the services tend not to have continuity. On this basis, it appears that the services provided by dental school clinics should not routinely be counted as provision of dental care for purposes of HMSA designation. However, given the infrequency with which this question arises, it may be appropriate to allow some flexibility in establishing and taking into account the volume of dental school clinic provision of general dental care, on a case-by-case basis, but only if the evidence is clear. A reliable and appropriate method for converting such visit volumes into full-time-equivalent general care dentists is still not available.

Adjustments for Dentists Age and Auxiliary Employment. The final cluster of issues related to measuring general dental care availability concerns adjustments for the dentist's age and for his employment of auxiliaries. The current criteria provide that dentist counts be adjusted to account for relative productivity differences among dental practices based on the number of auxiliaries employed, or, in the absence of such data, a proxy for such a measure that takes into account the age of the dentist, since age of the dentist is closely related to the number of auxiliaries utilized. The number of dentists in an area is calculated by multiplying the number of dentists in each age/auxiliary group by corresponding equivalency weights, and summing the products across all groups. The weights employed range only from .5 full-time-equivalent for older dentists employing no auxiliaries to 1.5 full-time-equivalent for younger dentists employing four or more auxiliaries. Since these criteria were first established, more recent productivity data have become available and should be examined to see if the measure could be improved.

Although differences in dentist productivity appear to be considerable enough and consistently enough related to age to be utilized as an adjustment, the inclusion of the number of auxiliaries employed is more ambiguous. The employment of auxiliaries by area dentists presumably increase care availability, but it may also reflect a supply adjustment to high levels of demand. Its inclusion thus may work against the identification of shortage areas, where patient care demands are sufficiently high to encourage dentists to employ high levels of auxiliaries, and toward designation of areas where few dentists employ auxiliaries. However, auxilary adjustment does add accuracy to the availability-of-services measure, and therefore seems an appropriate modification to straight dental manpower counts.

Population-to-Practitioner Ratio Cut-Off Levels for Designation

After determination of the rational service area, the appropriate estimate of the population and the number of practitioners, the proposed designation is compared with the population-to-practitioner levels set for designation. The decisions embodied in the criteria for these determinations are presented below.

Practitioner Availability Levels for Designation. The HMSA levels originally selected to indicate shortage in the availability of primary medical and dental care in geographic areas were an adjusted ratio of 3,500 persons per primary care physician and 5,000 persons per dentist. These cut-off levels were selected on the basis of county distributions of practitioners in 1974, the most recent data available at the time the criteria were developed. No intuitively obvious or consensus level clearly indicating a shortage condition was available, and both rates were determined on the basis of the distributions of practitioners among U.S. counties. In both cases, it was found that a ratio 1.5 times the median county population-practitioner ratio yielded a ratio close to the 75th percentile of the distribution, or the worst one-quarter of all U.S. counties. It was judged that an area with a ratio 50 percent worse than the typical (median) county would likely not have adequate practitioner availability. Now, as then, there is no completely sound empirical evidence to support these (or any other) specific cut-off points, although these levels have been widely reviewed and have generally been accepted as being reasonable. Consequently, the major basis for reconsidering the appropriateness of any cut-off levels is the question of whether they should be adjusted moderately to reflect recent changes and improvements in the county distribution of practitioner ratios.

During the late 1970's, there were marked increases in the Nation's supply of physicians and dentists. But at the critical, less-favorable end of the physician ratio distribution, there was minimal change during the period. Where the 75th percentile of the counties population per physician ratio was 3,540:1 in 1974, the 75th percentile ratio had changed only to 3,519:1 in 1979. No revision to this cut-off level thus seems indicated in these ratio cut-off levels.

In addition to the basic threshold for general designation, the criteria also allow designation of primary care shortage areas at a ratio of 3,000:1 if the area has high medical needs or insufficient primary care capacity and designation of dental shortage areas at a ratio of 4,000:1 if the area has high dental needs or insufficient dental care capacity. These adjustments serve as moderate easings of the cut-off levels where additional considerations are present, and appear to be reasonable.

Adjustments for High Unmet Need and Insufficient Capacity

The present HMSA criteria make adjustments to the population-to-practitioner ratio to allow for high need for care or insufficient capacity of care providers in an area. Essentially, the presence of these factors permits an area to be designated at a lower population-to-practitioner ratio than in their absence. In the case of the primary care manpower shortage criteria, for example, designation is made at a population-to-primary care physician ratio of 3000:1 rather than at the standard 3500:1.

The discussion here centers on the indicators employed, the "cut-off" levels at which they are deemed significant, and the general reasonableness of making such adjustments. For medical care, there are three indicators of high unmet need used in the criteria and two indicators of insufficient care capacity, which will be discussed first. This is followed by a discussion of the two measures of unmet need employed for dental care.

Indicators of High Unmet Medical Need and Insufficient Capacity. Under the current criteria for designation, an area is judged to have high unmet need if it displays a high level of any of three indicators--the extent of poverty, infant mortality, and high fertility. It is well established that poverty populations have much higher needs for care, evidenced by their higher mortality and disability rates and the prevalence of chronic conditions, and that their proportional needs for care far exceed their relative utilization of care. Under the current HMSA criteria, if more than 20 percent of the population in an area have incomes below the poverty level, then the area is deemed to have an unusually high need for services. This standard was developed for use with 1970 census data and used by the U.S. Census Bureau to identify low-income neighborhoods for special analyses. Because estimates of the prevalence of poverty in the Nation's counties are not yet available from the 1980 Census, little factual basis exists for assessing the current impact of the poverty criteria. Summary statistics for 1969, available from the 1970 Census, indicated that about 41 percent of all U.S. counties had poverty populations of 20 percent or more. Since the poverty level is adjusted to inflation, it is difficult to predict what proportion of the counties in the U.S. will meet the present criteria based upon the 1980 Census, even if the U.S. Bureau of the Census does not alter the standard for definition of low-income neighborhoods based upon the new 1980 Census data. In addition, the unavailability of county estimates between decennial Censuses is in itself a problem with use of this high need adjustment.

Because of the lack of local area poverty data between censuses, applicants for designation that in part base their case on the prevalence of poverty sometimes estimate their poverty prevalence based on a variety of measures employing local data, and little basis exists for validation of these estimates.

The second measure of an area's high unmet needs is existence of an infant mortality rate in excess of 20 infant deaths per 1,000 live births. One limitation of the data needed for this indicator is that, for areas with small populations, it is necessary to obtain an average rate over a three to five year period in order to ensure that the rate is statistically significant.

Infant mortality rates have improved markedly in recent years. Since the present criteria standard was set at the U.S. median for the years 1966-70, before the recent improvement, the infant mortality rate distribution for counties was recalculated using data from the more recent 1973-77 period, with the following results:

Infant Deaths/1000 Births 1973-77 Average	
Mean	16.4
Median	15.5
75th Percentile	19.2
90th Percentile	23.7

As is clear, the U.S. median for the period 1973-77 was 15.5 infant deaths/1000 births, well below the 20 deaths per 1000 births during the 1966-70 period. If it were deemed appropriate to maintain the approach of identifying all counties below the national median, a downward adjustment of the cut-off level would appear to be called for. On the other hand, retention of the current standard would identify almost 25 percent of all counties.

The third HMSA measure of high need in an area is more than 100 births per 1,000 women between the ages of 15 and 44. The justification for this indicator as a measure of high need is less strong than is the case for the other two measures employed. While this indicator identifies areas with more women in need of obstetrical care and more infants needing pediatric care than the average, there is little indication that such rates are clearly associated with greater care needs not being met. For instance, the distribution of fertility rates for all counties and for only those with more than 20 percent poverty in 1969 were practically identical. While teenage fertility was definitely higher in the high poverty counties, no sound conceptual basis is apparent for using fertility data to identify unique aspects of unmet need.

Associated considerations are that only one of the three indicators described above is required to demonstrate high need for the HMSA criteria and that relatively low cut-off levels of the indicators are required. For 1970, the HMSA poverty indicator identified 41 percent of all counties and the infant mortality indicator identified 50 percent. Taken separately, however, these cut-off levels do not constitute a screen in a meaningful sense. If high unmet need is reviewed as a single concept, the present use of discrete, unrelated indicators would seem to be inappropriate, because three different things are measured, rather than one. A more appropriate indicator could very well be a single measure having several components that would identify somewhere between 10 and 20 percent of all U.S. counties.

There is also the more general issue of whether indicators of unmet need are entirely appropriate for identifying and designating areas for programs primarily aimed at improving practitioner availability. Increased practitioner availability would not automatically increase the utilization of care by an area's population, since most indicators of high unmet need identify populations which seek far less care than they may need medically. In the absence of other factors, increased availability of practitioners may have little impact on high levels of unmet need. It would nonetheless seem logical to give added importance to high need measures in those areas where existing public programs are attempting to address unmet need and where increased practitioner availability would complement efforts to address unmet needs.

Indicators of Insufficient Medical Care Capacity. The Current HMSA criteria identify areas as having insufficient medical care capacity when any two of the following indicators are satisfied: 1) Unusually high visit levels per physician; 2) Unusually long waits for appointments; 3) Unusually long waiting times in the medical office; 4) Limited accepance of new patients in the area; 5) Abnormally low utilization; and 6) Excessive emergency room utilization. These indicators are generally quite difficult to establish and assess at the local area level. Because of this, they are seldom used in designation applications, and strong consideration has been given to ending their use in the HMSA criteria. It has also been pointed out that use of these measures by applicants for designation often reflect the data collection and estimation capability of the applicant as much as they do the factual situation. Many potentially eligible areas appear to lack the capability of demonstrating the existence of such insufficient medical care capacity.

Other HMSA indicators and their cut-off levels, together with an assessment of the present appropriateness of these levels, are briefly summarized below.

High visit levels per provider is defined as more than 8,000 office or outpatient visits per full-time equivalent physician in an area. In 1975, small metropolitan areas had the highest average of office visits per physician (6,400 a year), and the criteria standard was set at 125 percent of this average. More recent 1979 data show that the average number of visits per physician has declined to 6,074 in nonmetropolitan areas (which now have the highest rates). Using 125 percent of this rate would result in a standard of 7,600 visits, which would identify about 20 percent of the nonmetropolitan areas.

Unusually long waits for appointment in an area are defined as more than a seven-day wait for an appointment, based upon a 1975 survey data which indicated that this length of wait existed in 11 of the 100 largest metropolitan areas. More recent data from a 1979 survey found that the appointment waiting time at the roughly equivalent 90th percentile for these areas had declined to 4.3 days, with the corresponding figures being 5.8 days for smaller metropolitan areas, and 4.9 days for nonmetropolitan areas. The existing standard of wait times of over seven days would thus identify a much smaller 9 of 256 multicounty sample areas surveyed in 1979. A reduction of the standard to a waiting time of over 5 days would identify 2 percent of large SMSAs, about 15 percent of small SMSAs, and about 10 percent of nonmetropolitan sample areas.

Unusually long office waiting times for primary care providers are set at waits of more than one hour where there are appointments and over two hours otherwise, levels which were originally set on a largely judgmental basis. Newly available data for 1979 show that fewer than 10 percent of the surveyed areas had waiting times of over

30 minutes for patients with appointments, with the maximum time reported as an area average being slightly over 40 minutes. A more reasonable standard might now be 30 minutes for patients with appointments and one hour where patients are cared for on a first-come, first-served basis.

Limited acceptance of new patients is identified as the situation where over two-thirds of an area's physicians are limiting acceptance of new patients. In 1975, this value selected 10 percent of the survey areas. In 1979, a comparable 10 percent coverage would mean that three-fourths of an area's physicians limited new patient acceptance.

Abnormally low utilization is set as being an average of 2.0 or less office visits per person on the part of the area's population. This continues to appear reasonable as compared to the average numbers of office visits, but it is difficult to estimate reliably. An available alternative measure, not now included in the criteria, could be abnormally low area expenditures under Part B of Medicare. Use of this measure, however, would require an assumption that utilization by the aged is a sound proxy measure for the entire population, which has not yet been empirically determined. It would also require major changes in the criteria and the local data compilation required.

Excessive use of emergency rooms for non-emergent care. No level for this criterion is set in the HMSA regulations, but areas where less than 25 percent of all cases handled in area emergency rooms are considered urgent have generally been considered as having excessive use of E.R.'s. At the present time, no additional hard data have become available by which to assess this standard, although an involved, careful analysis of emergency room use in different areas, controlling for the presence of outpatient care and mortality from non-natural causes, would conceivably identify an empirical basis for it. However, this measure is often considered to reflect the care-seeking preferences of some areas, particularly inner-city areas, and thus its use may be inappropriate.

While the original intent of using insufficient capacity measures was directed toward measuring unmet demand, it is not clear that they have proved to be fully adequate measures of this concept. What they in reality appear to measure is the nondollar costs associated with obtaining primary medical care, and, as such, are actually relatively good measures of the concept of access. However, the logic behind its use as a measure of insufficient capacity, and hence of the concept of unmet demand, is that very high levels of these measures would indicate a situation where a population's care seeking is being rationed to a greater degree than normal. Presumably, the same population facing lesser nondollar costs associated with seeking care, as would logically result from increasing physician availability, would have greater demands for care. Nevertheless, this access measure has not been shown to be either a conceptually valid measure of unmet (or potential) demand, or to be a strong determinant of utilization in empirical measurement. (These problems have been discussed in the earlier chapter on alternative shortage measures and in the later chapter on measuring unmet demand.

Indicators of High Unmet Dental Need and Insufficient Capacity

Indicators of High Unmet Needs. Two indicators of high unmet dental needs exist in the criteria--a high proportion of poverty population and the absence of fluoridated water supplies for over half of the population. The poverty population indicator for dental care is the same as that for medical care, whereby an area is deemed to have high unmet dental care needs if 20 percent of the population is below the current poverty income threshold.

To assess a poverty standard relative to dental care, an attempt was made to measure the unmet need for dental care by the poor. The measure developed was the ratio of expected to actual utilization, adjusted by age, sex and dental health status. The ratio obtained was 1.697 expected visits per actual visit. Thus, the poor tend to use approximately one-third (35 percent) fewer dental care services than do the non-poor. Particularly in the case of dental care, where utilization is highly sensitive to financial resources, it must be recognized that this low utilization and associated low dental health status of the poverty population is not normally convertable into demands for dental care in the absence of an easing of financial barriers. In addition, it has also been pointed out that lack of knowledge of dental care needs, even where financial resources exist, tends to reduce the demand for care.

Fluoridation is recognized as reducing the need for restorative dental care services, and the indicator of fewer than half of the population not having fluoridated water supplies clearly identifies areas with possibly greater needs for restorative dentistry than the rest of the nation. Because fluoridation through central water supplies is available to much smaller proportions of rural populations, approximately half of the non-metropolitan applications for dental care shortage area designation have this indicator of high unmet needs included. While this proportion is high, it nevertheless appears to be an appropriate indicator overall, as the higher needs of non-fluoridated areas seem to be well established. However, the available data on fluoridation are outdated and more current information needs to be developed and examined.

A potential concern for use of this measure is the possibility that the reduction in caries resulting from fluoridation ultimately lead to increased needs for dental care and dental care utilization later in life, because of the greater numbers of healthy teeth subject to periodontal and similar late-emerging diseases. However, little research has been conducted to establish whether or not this possibility is real, and, accordingly, whether use of the fluoridation indicator is entirely appropriate.

Population Group Criteria

The HMSA population group criteria are quite general, simply stating that population groups will be designated if access barriers prevent them from utilizing the area's primary care or dental providers, and if the ratio of the number of persons in the population group to the number of practitioners serving the population group is at least 3000:1 in the case of primary care, and 4000:1 for dental care.

This approach has resulted in two types of problems: (1) For particular types of access barriers, it is difficult to identify and measure the population affected and the number of full-time-equivalent practitioners serving that population. This has particularly been a problem for low-income populations. (2) It is difficult to identify, and measure and develop appropriate ratios for those population groups whose needs for health care require significantly more practitioner time per person than average. Examples of this include the developmentally disabled and various handicapped groups.

An effort has been made to develop guidelines incorporating appropriate definitions and measurement approaches in order to deal with the first type of problem. At one point, draft guidelines were provided to individual applicants seeking population group designations, but questions were raised as to whether the guidelines were fully consistent with the published criteria. These guidelines were then reexamined, new ones drafted and reviewed by the Office of General Counsel, and revised guidelines prepared. The revised guidelines will soon be published in the Federal Register so that they will be available generally to all applicants. Nevertheless, there are many technical problemsin defining the access barriers involved and in making the appropriate counts, and further efforts are needed to develop better techniques.

With respect to the second type of problem, major additions and/or revisions to the published criteria would be needed to make possible a different threshold population-to-practitioner ratio or some alternate approach for special population groups such as the developmentally disabled. In addition, for each such population group, extensive research would be needed to identify the appropriate threshold ratio or other criteria. It probably would be simpler to handle these kinds of population groups using a method which compared number of patient visits required by the population with the number of visits provided by existing practitioners.

Facilities Designations

Criteria and designation procedures exist for identification of manpower shortages in prisons and State mental hospitals. All other facilities are dealt with according to whether or not they serve designated areas or population groups.

The only other significant problems in facility designations are those in which a facility is serving a special population group which cannot be designated under the existing criteria. Since this type of problem would disappear if special population group criteria were devised, it does not appear that additional facilities criteria are themselves necessary.

CHAPTER VI

INDICATORS OF UNMET DEMAND

The basic question to be addressed in this chapter is whether indicators of unmet demand can be identified and included in shortage area criteria, and, furthermore, whether it can be determined if the unmet demand detected in a shortage area is likely to be met within a two-year period. These questions, posed by the Omnibus Reconciliation Act of 1981, appear to reflect two congressional concerns: (1) that the current criteria are need-oriented and do not take into account whether unmet demand is present, thus possibly resulting in placement of health professionals in areas where they may not be fully utilized, and (2) that some health professionals may be being placed in areas which have temporary shortages that would otherwise be eliminated by normal market mechanisms and private sector initiatives. These questions raise various conceptual and empirical issues which will be dealt with in this chapter. The possibility of dealing with the unmet demand issue through use of a revamped degree-of-shortage grouping of designated areas is also discussed.

The Concept of Unmet Demand

The current shortage area criteria focus on the availability of and unmet need for health manpower in local areas relative to nationwide norms. Areas which have an apparent relative scarcity of health manpower are designated as shortage areas, which makes them candidates for possible placement of National Health Service Corps personnel and leads to the closer NHSC scrutiny that precedes any placement. As discussed earlier, in assessing the merits of proposed placements in local areas, the National Health Service Corps is required by law to consider a number of factors, including the demand as well as the need for health services. These factors are dealt with in conjunction with the NHSC's own resource allocation process for placement of personnel.

To include consideration of unmet demand in the shortage area designation criteria would shift the emphasis of the criteria from concepts of availability toward concepts grounded in economics. It would also reorient the administrative burden of assessing local market conditions away from the placement process, which has traditionally been the focus for consideration of demand factors and which involves regional office staff together with heavy local area involvement, toward the designation process which has traditionally been need-oriented and has pursued its role from a more national perspective.

To include indicators of unmet demand in the shortage area criteria also calls for developing specific quantitative measures. First, however it is necessary to define the exact concept for which measures are sought. The concept of demand is sometimes confused with that of need in the health services field. Whereas the concept of need remains somewhat ambiguous and elusive, the concept of demand is well-developed in the discipline of economics, which offers a number of approaches to its actual measurement. This chapter will draw on the technical framework available from economics to address the questions posed above.

Much of the idea of unmet demand has been formalized in economics in the concept of excess demand, as was discussed in Chapter III. Excess demand is said to exist when the demand for a good or service exceeds the supply under specific circumstances of market adjustment. In typical market adjustment processes, excess demand is a temporary phenomenon. In such situations, excess demand is eliminated soon after it appears by increases in prices, which ration the limited supply among demanders; the increases in price which eliminate excess demand also serve to attract additional supply into the market. If prices do not rise, however, excess demand will persist because no additional supplies will be attracted to the market. In typical market adjustment processes, the increase in price is a "market signal" to suppliers that the good or service is valued relatively more than in other markets where prices are lower.

If prices do not rise to eliminate excess demand, then other signals must be sent out from the market that is experiencing the excess demand if additional supplies are to be attracted. This is probably a common situation in the physician service market, where recruiting activities of practitioners and community organizations may be used to attract new physicians because practitioners already located in the community are often reluctant to raise fees in the short run to ration their services. Consequently, excess demand may be more characteristic of medical markets than of other markets where prices might fluctuate more freely in response to changes in economic conditions and short-term fluctuations in supplies relative to demand.

The economic theory of excess demand encompasses the two elements of the question addressed by this chapter. Excess demand indicates that the individuals in a market area are willing to buy more of a good or service than suppliers currently provide to them; and the market eliminates excess demand by sending market signals to attract additional supplies into the market. These market signals generate an attraction to potential suppliers outside the market to locate within the market and increase the supply of the service demanded by the population.

While the economic theory of excess demand is straightforward and provides a starting point for a search for actual indicators of unmet demand, empirical indications of excess demand are varied as well as obscure, since excess demand is part of a dynamic process which has a number of dimensions. Also, the existence of excess demand over a sustained period of time is indicative of market malfunction in some respects. The possibility that excess demand may exist in significant numbers of designated health manpower shortage areas raises the question of how well the markets for health manpower, particularly for physicians and dentists, work to distribute health manpower geographically. Research on this issue has led to some estimates of the speed of adjustment of the markets for physicians and dentists which are relevant to the questions addressed in this chapter.

Diffusion of Health Professionals

If market mechanisms worked freely and rapidly in the health services markets, there would be little economic justification for public programs to supplement the market-determined geographical distribution of health manpower. However, a number of economists believe that the markets for health services are faulty and are not capable of distributing health manpower in competitive-market determined patterns that would be desirable from the public standpoint. There is currently a debate (among practicing health economists particularly, and within the medical and public health fields generally) about whether the recent and projected future increases in supplies of physicians and dentists will solve the perceived maldistribution problem through market diffusion mechanisms, or whether the maldistribution problem will persist despite significant infusions of additional physicians and dentists into the American health care system.

In a recent paper prepared for the Assistant Secretary for Health, the Health Resources and Services Administration documented the available evidence on the issue of the diffusion of physicians and dentists.[1] The report concluded that recent changes observable in the geographic distributions of physicians and dentists appear to be consistent with expected patterns of diffusion, but that no definitive cause-and-effect conclusions could as yet be drawn from the available data. Similarly, the results of other studies of particular facets of the diffusion question summarized in the report provide mutually reinforcing indications that diffusion of physicians and dentists is indeed taking place, although its pace seems not to be rapid. Other recent econometric research has also confirmed that the operation of market mechanisms in large part underlies the geographic distributions of both physicians and dentists. Consequently, the report concluded that the necessary market conditions for diffusion are probably present, although the tentative measurements of the speed of diffusion that have been made indicate that market adjustments are not rapid.

Since the HRSA Report on diffusion was completed, the results of a new study were published which reinforce the diffusion hypothesis. The most recent evidence comes from an update and extension of previously published research at the Rand Corp. by Newhouse and associates.[2] The new study suggests that market forces are a key determinant of physician location, contradicting the popular view that physicians' extraordinary economic power makes them immune to supply and demand. The authors conclude that people in almost every community with a population of 2,500 or more now have "ready access" to a physician, i.e., are within 25 miles of a physician. However, this is "as the crow flies" mileage and cannot be translated into actual travel time. Furthermore, this study does not deal with the question of how many people are served by these rural physicians.

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[1] Analysis of the Diffusion of Health Professionals," in The National Health Service Corps Program for the 80's. Discussion Paper regarding the NHSC transmitted to the Assistant Secretary for Health, February 18, 1982.

[2] Newhouse, Joseph P.; Albert P. Williams; Bruce W. Bennett; and Schwartz, William B., "Where Have All the Doctors Gone?" Journal of the American Medical Association, Vol. 247, No. 17 (May 7, 1982), pp. 2392-2406.

Other analyses do indicate that the physician-to-population ratio in non-metropolitan areas generally has recently begun to rise. However, the fact that this has happened only recently may be misleading, according to Newhouse and Schwartz. These areas did experience an influx of physicians throughout the last two decades due to competition among specialists in urban areas causing them to begin locating in less urbanized areas. This influx was offset, however, by the fact that large numbers of general practitioners in rural areas were dying or retiring. Recently, however, the output of family medicine programs has begun to offset these losses, so that the numbers of both primary care physicians and specialists are likely to continue to increase in nonmetropolitan areas.

The question of the extent of geographic diffusion and the underlying mechanisms fueling it remains a complex research problem. In analysis of the diffusion issue, it is proving extremely difficult to separate the effects of the general increase in the supply of health professionals and the changes in its composition over time from the effects of changes in market conditions at the local level which induce movements of practitioners into particular local service areas. Most research on the diffusion issue has been undertaken at the aggregate level of analysis and does not address the question at the level of the individual county or shortage area. While it is clear that the substantial overall increase in practitioners has begun to result in increases in practitioner-to-population ratios and that the appearance of more specialists in nonmetropolitan areas is partially due to the increasing proportion of specialists in the overall medical work force, the exact mechanisms and speed of local market adjustment remain unclear to researchers in this field. Moreover, the fact that diffusion appears to be occurring generally within the United States does not necessarily imply that it will affect those areas having a weak economic base or that are otherwise unattractive to private practitioners, nor does it provide any method for predicting or estimating the likelihood that excess demand in any given area will be met within a specific period of time.

Measures of Unmet Demand

What indicators of unmet demand might be available to incorporate into the general shortage area criteria? For the purposes of this report, unmet demand can be said to exist when a locality or area is generating an "attractive force" to practitioners on the outside, indicating to them that the area presents a potentially viable practice location. For example, the attractive force could be manifested in high professional fees or incomes relative to those in other areas which practitioners seeking practice locations might consider, or it could be manifested in explicit recruiting efforts undertaken by the community or particular members of it. Even in the case of explicit recruiting efforts, however, unmet demand may not actually be present in the strict economic sense that residents of the community are really willing and able to compete on an economic basis with other communities to attract or sustain more practitioners. The ultimate test of the presence of unmet demand is whether the individuals residing in the community will actually express an effective economic demand for a new practitioner's services. Even then, practitioners considering the community as a practice site may conclude that an adequate level of effective demand is not present in the community, or, if it is, that it is not strong enough to offset other negative, non-economic factors. Thus, explicit recruiting efforts could be a false indicator of unmet demand in any particular situation.

Since unmet demand cannot be observed directly, the relationship of postulated measures to the actual existence of unmet demand is purely speculative. The only way to confirm that such a relationship truly exists is to perform the ultimate experiment of placing physicians in areas where postulated measures indicate the presence of unmet demand and then observe the results. This, of course, is what businesspeople do every time that they choose the location for any similar service business: research market conditions until they are sure enough of the economic potential of a prospective location to gamble that it is a viable one by performing the ultimate test of actually going into business there. Many find that they were wrong. Thus, it cannot be expected that unmet demand for physicians or dentists can be detected with any degree of certainty. Furthermore, businesspeople concentrating on a few potential locations are able to research potential sites in much greater depth and detail than resources will allow Federal program officials to pursue (given more than 2000 primary care and 900 dental health manpower shortage areas). Consequently, it is to be expected that approaches available to the shortage area designation program would have even less success in locating viable business locations than the average small businessperson in the United States.

In theory, some direct indicators of unmet demand exist and could be employed. The clearly useful ones would be those for which measures and data are available nationwide at a level of disaggregation pertinent to shortage area designation, i.e., the county or subcounty level. Unfortunately, few such measures are available. In particular, measures of the economic variables which are the most obvious possibilities for indicators of unmet demand are not available at the requisite level of small area detail for use in shortage area designation. These are variables such as physician or dental fees, current practice incomes or receipts, and other measures of the levels of economic activity sustained by practices in a market. Consequently, due to the lack of readily available data, it is unlikely that a direct approach to incorporating obvious indicators of unmet demand into the shortage area criteria could be implemented immediately.

However, research is currently being conducted to determine whether variables which have been measured only on an ad-hoc sample basis might be usefully integrated into the shortage area designation criteria if they were available on a wider and regular basis. A number of potential indicators have been collected from samples of physician practices through the Physician Capacity Utilization Surveys. Correlations between proposed indicators of excess demand from these surveys and various alternative shortage area criteria were discussed in Chapter III. So far, it appears that "shortage area" counties do not stand out in termsof any of the proposed indicators. Much more research and analysis of possible direct measures of unmet demand thus remains to be cone before applicable results can be said to be forthcomming.

A more indirect approach may be available, however, by using aberrations in the distribution of the practitioner-to-population ratio itself as an indicator of unmet demand. Statistical analysis of county cross-section data shows that county population and per capita income statistically explain more than 85 percent of the variation in the numbers of physicians and dentists across counties in the United States.[1/] While a very large number of counties thus adhere to a very strict pattern in terms of the locational response of practitioners to the demands for services manifested by the population and income distributions across counties, a few have substantially less than the numbers of practitioners expected on the basis of the strong statistical relationship with population and income. It is in these counties where unmet demand might be predicted (for verification by closer examination); much more difficult would be the identification of unmet demand in subcounty areas. The Bureau of Health Professions is currently conducting research to ascertain whether such a "statistical outlier" approach to integrating considerations of unmet demand into shortage area designation can identify those shortage areas which offer reasonable prospects to National Health Service Corps Personnel wishing to choose the Private Practice Option for fulfilling their obligations to the Corps. However, this approach would still rely on the NHSC placement program to confirm the presence of unment demand through their case-by-case review of each potential NHSC site and/or PPO location.

Another approach being examined for its possible relevance to identifying unmet demand for health manpower is that put into operation in 1981 by the then Bureau of Community Health Services, HSA, in their evaluation of community health center and urban and rural health initiative grant requests. All grantees receiving Federal grant funds for primary care centers must demonstrate, as part of their application, the need and demand for primary care services in their service area. This "needs/demand assessment" is performed locally by each center and requires considerable local data and/or judgments. It also draws heavily on the HMSA criteria and related cut-off points. However, since theneeded demand assessment is largely unrelated to the specific manpower issues involved in the HMSA criteria, its direct applicability may be limited. Nevertheless, this approach will be examined closely to determine if some aspects of it can be utilized in dealing with the issue of determining unmet demand for health manpower.

[1/] Ordinary linear regression equations with the numbers of active practitioners (primary care physicians or dentists) per county as dependent variables, and with county population and percapita income as independent variables consistently have coefficients of determination (R^2) of 0.85 or greater.

Will Unmet Demand be Met in Two Years?

To predict whether a particular shortage area will attract practitioners within two years requires detailed knowledge of the particular circumstances of the area. For example, one needs to know whether special recruiting efforts are being undertaken by the community (or practitioners within the community) to attract additional personnel, how long such efforts if any have been undertaken, and what degree of success similar recruitment efforts have had in the past. One must also know many things about the local economy--the composition of business and economic activity in the area, the incomes and spending patterns of the population, and whether the area is experiencing growth or decline in its population and economic base. Such a wealth of information is simply beyond the scope of the data generally available to the shortage area designation program. Rather, the designation program must work with data that are only generally descriptive of the areas in just a few important dimensions that are statistically indicative of conditions in the areas. The shortage area criteria serve as a first-stage screening device by which areas are identified on the basis of a few statistics for further scrutiny in subsequent stages of the NHSC placement process. To require the shortage area designation process to conduct the detailed demand analysis necessary to predict whether the area will attract practitioners within two years would require radical changes in organization of the program and the resources available to it, and would overlap with the more direct responsibility of the NHSC to conduct need and demand analyses as part of the detailed, local-area oriented corps application approval and placement.

One possible approach would be to provide the shortage area designation program and the NHSC jointly with a market research capability which would allow inspection of potential locations on a case-by-case basis, using standard market research techniques adapted to this particular purpose. Such an approach would be labor-intensive and expensive, but would provide the investigative ability necessary to identify the presence of unmet demand with an acceptable degree of reliability. Such an approach would involve market analysis of those designated shortage areas which are being considered for placement of a particular health professional. Essentially, then, the program would provide marketing research services to the individual considering locating in a particular area, but this research would answer questions related to the NHSC resource allocation criteria, i.e., whether the area is likely to attract a private practitioner within two years so as to render the placement of a Federal or Federally-supported physician in the area unnecessary. A similar approach would be to draw upon State resources to provide the necessary marketing research, under an appropriate set of guidelines and standards.

An alternative approach to addressing the unmet demand issue which could affect the allocation of NHSC placements in the direction desired by the Congress is discussed in the remainder of this chapter. This approach consists of possible revision of the degree-of-shortage groupings in a way which relates directly to the unmet demand issue. The following sections discuss the degree-of-shortage groupings and possible modifications to them.

Appropriateness of Current Degree-of-shortage Groupings

Section 333(c) of the PHS Act requires that the NHSC give priority in assignment of Corps members to those shortage areas with the "greatest" health manpower shortage. Because of this provision, groupings for areas with different degrees of shortage were defined in the shortage area criteria so that NHSC placement priority could be given to applications according to their degree of shortage. However, the degree-of-shortage groupings are just the first of a series of factors required to be considered in approving applications for NHSC personnel and setting priorities among them for their assignment to shortage areas. Other factors to be taken into account under the 1976 legislation are community support, comments of health professions societies, and the use of physician extenders and expanded function dental auxiliaries.

The degree of shortage was therefore originally envisioned as a discriminant based on level of need only, and the degree-of-shortage groupings were selected on the basis of ranges of the major variables used in the criteria. At the present time, four levels or degrees of shortage are identified under the shortage area criteria. Ranges of the population-to-practitioner ratio for each group were chosen largely on a professional judgment basis, as follows: Group 1 designations basically consist of those areas with no providers; Group 2 (in the case of primary care designations) all other areas with a ratio greater than 5000:1; Group 3, all remaining areas with ratios greater than 4000:1; and Group 4, those areas with population/practitioner ratios between 3500:1 and 4000:1. However, if an area has indicators of high need or insufficient capacity, it is promoted one group. In addition, areas with ratios between 3000:1 and 3500:1, but having high needs or insufficient capacity, are placed in Group 4. A similar scheme is used for dental care.

Under current policy, NHSC placements of federally-salaried individuals are made only to Groups 1 and 2. Therefore, these groupings have assumed a much greater significance than was originally anticipated. The relatively insignificant differences between areas high in Group 3 and low in Group 2 are greatly magnified by this placement constraint. In addition, the adjustment for high levels of unmet need or insufficient capacity in many cases assumes a critical importance for determining which areas are eligible for NHSC placement. In effect, the degree-of-shortage groups and the resulting National Health Service Corps priority placements are now based almost exclusively on criteria-based need indicators.

However, the Omnibus Reconciliation Act of 1981 includes new requirements for NHSC placements. While continuing the requirement that the Corps give priority to placement of personnel in areas of greatest need, the new legislation also requires that the Secretary assign members of the Corps to an area only after the Secretary has considered both the need and demand for health manpower in that area. The Reconciliation Act also called for the present evaluation and for the consideration of alternative criteria that would take into account the actual use of health professions personnel by residents of an area, their health status, indicators of unmet demand and the likelihood that such demand would not be met in two years. These requirements clearly indicate congressional intent that the process leading to placement of NHSC physicians and dentists should now more heavily emphasize an area's demand as well as its need for services.

Particularly in light of the new Congressional requirements, the present degree-of-shortage groupings appear to be unsatisfactory. They often make sharp distinctions between relatively similar areas. For example, since the major consideration in assigning the groupings is the population-to-practitioner ratio, two areas with the same ratio but different populations are always assigned to the same group, even though one may have a substantially higher unserved population. Similarly, an area without a physician automatically receives first priority even though it may have a very small population. The assignment of an area to degree-of-shortage groups is also strongly affected by whether the area has indicators of high unmet need. This is appropriate where those needs can be translated into effective demand but otherwise may be thought of as inappropriate, given the increased emphasis given to demand considerations in the recent legislation. Finally, these groupings tend to treat manpower shortages as a single type of problem, at a time when there is growing recognition of various NHSC roles in meeting different types of shortages, particularly considering the expanded NHSC private practice option.

Possible Modifications of the Degree-of-Shortage Groups There appear to be three distinct dimensions to health manpower shortages which may be pertinent to or useful in identifying the degree of shortage for designation activities. First, there is the basic dimension of practitioner availability--the relative presence of sources of care--which is pertinent to all types of designation. The second is the presence of high unmet health care needs in an area, which is particularly pertinent where potential assignees can be placed with other programs already present which are directed specifically at the aspects of high need evident in that particular area. The third dimension is that of high unmet demand for health care, which is particularly pertinent to an area's capability for financially supporting an additional practitioner or practitioners. A fourth dimension, less easily dealt with, is that of the attractiveness of the area to health professionals.

If the different dimensions of shortage are considered along with shortage severity and other factors, a different approach to the categorization of designated areas may be suggested. Shortage area characteristics and recent congressional mandates seem to suggest categorization into three basic types of shortage areas.

The first category would be those health manpower shortage areas which have unmet needs, low economic resources, and evidence of unmet demand as indicated by such factors as long waiting times and excessive use of emergency rooms for primary care. Because of their low economic resources, these areas might not be able to support a private practice option physician who wished to open his or her own private practice and have it become economically viable. These would be the areas that would be most appropriate for NHSC Federal placements. (These areas would not necessarily be ineligible for private practice option, however, since some of those areas which have low economic resources may nevertheless have a local, State, or federally-supported clinic program which could hire a physician on salary.)

The second group of areas would be those that have unmet needs and an adequate economic demand but are unattractive for various reasons to private physicians. These areas would seem most appropriate for private practice option personnel.

The third category would be those areas that have unmet needs for health services, high levels of unmet economic demand, and would likely be attractive to new physicians. This group would consist of areas that do not currently have sufficient physicians but which have a high likelihood of attracting new physicians through the private sector. Such HMSAs should therefore have the lowest priority for NHSC service, whether by federally-salaried personnel or private practice option personnel.

Since one would suspect that some diffusion of physicians may be occurring into areas of type 3 above, but not into areas of type 1 and 2, private practice option physicians should be encouraged to go into the areas described under type 2 above, in hopes that these physicians might remain in these areas into the future following completion of their obligation. The type 1 areas may very well be areas where Federal physicians (or private practice option physicians supported by salaries from some source) would have to be used over a period of time into the future.

Given this categorization, shortage areas could perhaps be grouped for priority purposes in two ways--one set of priority groupings of areas appropriate for Federally-salaried NHSC personnel and a second set of priority groupings of areas appropriate for the NHSC's private practice option. To develop such priority groupings would require an examination not only of need indicators (as in the present degree-of-shortage groupings) but also of demand indicators and "attractiveness" indicators. It may also be appropriate to attempt to develop and use a series of screens: perhaps one screen ranking areas by some measure of overall need, another ranking them by level of economic resources, and a third ranking them by their attractiveness. Such factors as the presence of existing health care programs with vacancies for health professionals should also be considered if possible, since placements in such programs may be expected to have a more significant impact. Priorities among shortage areas could then be determined separately for private practice option and for Federal-salaried NHSC personnel. However, a great deal of additional work is needed to select appropriate data and identification methods before such an approach can be developed and implemented.

Summary and Conclusions

This Chapter has dealt with the problem of including indicators of unmet demand in the health manpower shortage area criteria, and of identifying individual shortage areas which will attract adequate practitioners on their own within a period of two years. While the economic concept of excess demand is an approximate formal counterpart to the idea of unmet demand, unmet demand was defined more generally as any condition within an area generating an attraction to practitioners seeking practice locations and which manifests a potentially adequate effective economic demand for their services to support additional practices.

A great deal of uncertainty surrounds the actual existence of unmet demand in any given area; it cannot be observed directly, but only confirmed by the eventual success of establishing a practice. Thus, the testing for the presence of unmet demand essentially is a gamble that every businessperson, including health professionals, must ultimately take in establishing a business. Unfortunately, there are no sure indicators of unmet demand available, and the relationships between postulated indicators and the existence of unmet demand cannot be readily determined.

The Bureau of Health Professions is conducting research to determine what indicators of unmet demand might be available to incorporate into or in conjunction with shortage area designation criteria. Several approaches are being explored. However, the opportunities for developing an immediately applicable set of indicators are limited by the availability of data comparable in scope and detail to the data currently used by the program to designate shortage areas. Other smaller, more restrictive data bases are also being experimented with to assess the usefulness of other indicators that could possibly be collected more widely and regularly in the future. Generally, data limitations can be expected to continue to restrict the capability to assess and employ indicators of unmet demand directly in the shortage area designation criteria.

An alternative approach to attempting to directly identify unmet demand would be to categorize and prioritize designated HMSAs in a different way than at present, discarding the current degree-of-shortage groups and developing a revised scheme which would categorize areas according to the type of shortage. In this way, NHSC placements could be targeted toward the problems causing perceived shortages while allowing conflicting objectives of the placement program to be met more intelligently and allowing for separate treatment of the two major modes of NHSC placement---federally-salaried and PPO.

PART THREE

CONCLUSIONS

CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS

This report has evaluated the health manpower shortage area designation criteria and designation procedures from several perspectives. It has reviewed the history of shortage area designation and examined its relationship to past and present Federal programs aimed at dealing with problems of the distribution and accessibility of health care and health personnel. Various different theoretical concepts of shortage and their relationships have been discussed and relevant administrative, operational, and programmatic considerations summarized. The empirical findings of a comparison of the present HMSA designations with the designations that would result from several alternate approaches to measuring shortages were presented. The accuracy of existing designations, as reflected by application of the present criteria, was analyzed, and the findings from a case study of local areas in three States were reported, including the personal views of various officials in these areas. The specific indicators and cut-off levels used in the criteria were analyzed and possibilities for improvement discussed. Finally, problems in the conceptualization and measurement of "unmet demand" were discussed and assessed, and several possible approaches to its measurement presented, along with a discussion of the possibility of using revised degree-of-shortage groupings to help address the issue of unmet demand.

Each of the components of this evaluation study has provided a different perspective on the effectiveness of the present shortage area designation criteria and procedures. The material covered has thus been very wide-ranging and is difficult to distill into a simple summary overview of the adequacy and weaknesses of the designation process. Nevertheless, some common themes emerge from the different assessments presented, providing an appropriate perspective for recommendations to improve the HMSA designation criteria and process. These overall themes are presented first and are followed by specific conclusions of the report and recommendations for improvement and revision of the HMSA criteria.

Overview and General Observations

o Evaluation of the criteria must be made from the perspective of their historical development, the changing purposes which they have served over time, and the administrative environment within which they have been developed and applied. The shortage area criteria and procedures have evolved incrementally over the largest part of a decade, reflecting changing congressional mandates and shifts in program emphases due to changes in congressional perspectives on the problems of geographic maldistribution, medical underservice and manpower shortages and the development of various initiatives for dealing with these problems.

o In their present form, the HMSA criteria focus on the availability of health manpower, with a secondary emphasis on unmet needs for health care and consideration of problems of insufficient delivery capacity and lack of access to health care. The HMSA criteria thus are not directly aimed at the problem of improving health status per se, but rather at addressing the issue of increasing the availability of health services through increased numbers of health professionals. Focusing on availability will not in itself lead directly to improved health status, for health status problems more and more are being recognized as stemming in large part from life-style, social environment, and other causes not directly affected by health professionals' services, to such a degree that increased practitioner availability alone is properly seen as being only one aspect of achieving improvements in health status in many geographic areas.

o Many of the limitations of the present HMSA designation criteria and process are due to the continuing problems caused by the lack of adequate local area data. Local area data that are nationally available provide only general measures and are often dated. Although this perennial problem may ease temporarily when detailed local area data from the 1980 Census become available and while they remain moderately current, data problems will continue to remain a source of concern. The lack of extensive, accurate current data on local areas also has an impact beyond the immediate problem of assessing local area shortages, as it is a major contributor to the slow progress being made in understanding and measuring unmet demand and other market aspects of program concern.

o A factor that helps compensate for lack of precision in the criteria is that the initial designation of a shortage area does not represent the full extent of assessment of an area's situation prior to the placement of an NHSC provider. It is simply the first step, with subsequent assessments made by the NHSC in evaluation of applications for personnel, in selection of approved sites for placement, and in final matching of NHSC practitioners with approved sites.

o A major strength of the HMSA designation process is the substantial involvement in it of State and local organizations. Because of the limitations of both national and local data, such involvement is critical to an accurate assessment of current local conditions. The consistency and equity fostered by the national perspective of the program is augmented significantly by the contributions of State and local organizations.

o While the HMSA criteria are used mostly for identifying potential areas for placement of NHSC personnel, they are also used in other programs of the Health Resources and Services Administration and in similar programs in many States. Major changes in the criteria that would change the designation status of areas could have a deleterious effect on applicants from currently designated areas which are already served or are in the pipeline to obtain coverage under the NHSC and/or these other programs, and could thus create related administrative and operational burdens.

o The present burden upon applicants for designation is moderate; the use of sophisticated technical concepts is not required and data collection requirements are not extensive. Care must be taken to avoid making alterations in the designation criteria and process that would unnecessarily increase applicant burden, introduce bias against those unfamiliar with sophisticated concepts of shortage or with complex techniques of estimation, or require heavy additional data requirements.

- Use of the lists of designated shortage areas as a more precise tool for directing Federal health care service and manpower program efforts will require improvements in the program's ability to distinguish between the many different underlying causes of underservice and shortages in different designated areas. Such a differentiation could provide a basis for targeting programs on additional aspects of shortage, such as unmet needs for health services, inadequate access to health services and manpower, or the simple unavailability of health and manpower.

Specific Conclusions and Recommendations

In the sections that follow, a number of conclusions are drawn from the analyses conducted for this evaluation and a number of recommendations for improvements in the criteria and/or desirable future directions for the designation program are made. These conclusions and recommendations are categorized into three separate types--those addressing the more general aspects of designation, those addressing the specific content of the criteria, and those relating to the measurement of unmet demand. Specific recommendations are made with regard to each group of conclusions. Because many of the recommendations require further analysis or development and therefore cannot be implemented immediately, some recommendations are followed by a notation in parentheses indicating whether they can be addressed in the "short term" or the "long term." Recommendations for the short-term are those that could be implemented within the next year based on information, methodologies and resources already available. Recommendations for the long-term are those that would likely require at least one year of preparatory development and could not be implemented until after that.

General Concept of Shortage for Designation Purposes--(Chapters II and III)

- Congressional mandates for both HMSA designation and NHSC placement dictate multiple objectives for the programs, relating to the concepts of availability of health manpower, need for care, access to services, improvement of health status, and, most recently, economic demand for health care. Many theoretical and practical problems are associated with the measurement of these concepts, with their amalgamation into one set of criteria and with their ultimate implementation. No clearly preferable, readily implementable approach to amalgamating multiple goals for designation emerged from the extensive analyses conducted in this study.

- Despite this seeming ambiguity or conflict of goals and the problems of dealing with them, placement of health professionals in shortage areas (or incentives for health professionals to locate in shortage areas) clearly is the basic objective of the NHSC and the other programs that use designated HMSAs. Thus, ensuring availability of health professionals in shortage areas has been assumed to be the principal goal of these programs and therefore has been the basic concept measured by the HMSA designation criteria.[1] However, additional shortage concepts also need be taken into account, particularly that of unmet need because of its clearly stated legislative basis.[2] Still, it would be inappropriate to place health personnel in areas having ample practitioner availability unless they are placed only to address the needs of a particular population group which has been identified as being shut out from the area's existing health care system and has been separately designated on that basis.

> Recommendation 1.
> Lack of availability of health manpower (as indicated generally by the practitioner/population ratio) should be continued as the primary concept for designation of health manpower shortage areas, with measures of other dimensions of shortage included only in conjunction with the primary test of practitioner unavailability.
>
> Recommendation 2.
> To the extent possible, legislatively-addressed concerns such as unmet need, inadequate access, and poor health status should be used in conjunction with the availability criteria, but on a subsidiary basis. These complementary concepts, employed as secondary criteria, may be accommodated in one or more of three ways: (a) by lowering the availability cut-off criterion where indicators of these problems are present;
> (b) by identifying population groups with access problems for whom the availability criterion should be applied separately from the rest of the geographic area; or (c) by ranking the designated HMSAs in priority order according to these other concepts. However, present measures of unmet need and other shortage dimensions beyond availability of health manpower are not fully satisfactory; additional efforts are needed to develop better measures of these concepts.
>
> Recommendation 3.
> During the development of future legislation dealing with shortage area designation, the NHSC, and related programs, the Department and the Congress should give particular attention to language clarifying the specific goals of health manpower shortage area designation and related programs and indicating relative priorities among the often conflicting objectives implied by usage of the terms shortage, need, unmet demand, etc.

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[1] This is consistent with PHS Act Section 332(b)(1).
[2] Section 322 (b)(2).

Overall Soundness of the Criteria and Procedures: (Chapter IV)

o Although a number of specific findings of the comparison of various alternative criteria and indices are presented in Chapter III, the analysis uncovered no critical weaknesses of the current criteria that would warrant changing the overall approach. No available, superior alternative was identified by the study. The criteria may not result in a perfect ordering of areas in terms of relative shortage, but the analysis of the application of the HMSA criteria in Chapter IV did not indicate that substantial numbers of areas have been designated erroneously (were false positives) or missed entirely (were false negatives). Both the nature of the problems found and the extensive State and local review of proposed designations appear to support the conclusion that areas with real availability problems are designated, whether or not the severity of the shortage is measured exactly. Overall, the approximate error rate for designations was estimated to be on the order of 2 percent.

Rational Service Areas (Chapter V)

o The definition of rational service areas is a particularly difficult problem to address from a national perspective. On the one hand, a substantial degree of uniformity in approach across the Nation is desirable. On the other hand, there is an equally strong need to properly reflect local conditions in defining service areas. The present approach of considering and reviewing proposed areas on a case-by-case basis meets the need for reflecting local conditions in those cases that are submitted, but it does little to provide for uniformity across States, regions and the nation, since areas not specifically seeking designation are either not considered or are considered for designation only at the county level, which may not be the most appropriate service area.

Recommendation 4.
Using general national guidelines, each State should be encouraged to define rational service areas for their State (crossing State boundaries where appropriate) for the various health professions covered by the shortage criteria, or to recommend existing already-defined service areas for use in designation. This would provide a uniform set of service areas to which the HMSA criteria could be more confidently applied. (Short-term)

Recommendation 5.
Further analysis should be undertaken on the effect of transportation patterns and travel time on the utilization of health services in different areas of the Nation, for use in providing better guidance on the identification of rational service areas. Alternate means of defining rational service areas, with particular attention to data availability considerations, should also be pursued, such as the use of postal zip code areas. (Long-term)

Population counts and Adjustments (Chapter V)

o The approach used to estimate area populations for purposes of measuring care availability appears to be generally consistent with the goals of the program. However, adjustments made for age-sex differences in an area's population to account for utilization differences make little practical difference, while they are often difficult to estimate and verify because of lack of data.

> Recommendation 6.
> Population adjustments for age-sex differences in utilization of health care in local areas should be reevaluated when the necessary 1980 census data become available, so that a more precise estimate can be made of the possible impact of such adjustments on designations. Reflecting the results of that evaluation, such adjustments should then either be deleted or simplified (e.g., to refer only to very young and aged populations.) (Short-term)

o The adjustments for populations temporarily present in an area are not entirely satisfactory; the weighted averages used result in an adjusted population measure that reflects neither the permanent nor peak population. In practice, adjustments for tourist population generally make little appreciable difference in the estimates of shortage. It is not likely that tourists normally seek primary care away from their regular residence. The likelihood is also that many seasonal residents come from non-shortage area permanent residences and are capable of seeking and attaining care through normal markets. On the other hand, adjustments for migrant and other seasonal populations can make a significant difference in an area's shortage status. Furthermore, migrant worker populations present a very significant problem, in that they have high needs and usually receive little regular care.

> Recommendation 7.
> Specific population adjustments for tourists and possibly for seasonally resident populations should be deleted from the criteria. (Short-term)

> Recommendation 8.
> Population adjustments for migrant workers should be retained in the criteria. However, efforts should be undertaken to determine a more appropriate way to calculate and incorporate their numbers in an area's population base. Wherever possible, migrants should be dealt with separately as a population group, rather than through an adjustment to an area's population. (Short-term)

Practitioner counts and Adjustments (Chapter V)

o The criteria for estimating numbers of practitioners appear to be relatively sound and reasonable, at least in terms of basic "head-count" estimates. Full-time equivalency adjustments for part-time primary care provision and partial retirement of physicians are adequate, as are the adjustments for dentist productivity in relation to age and number of auxiliaries. Additional adjustments to the dentist counts based on productivity of different types of auxiliaries employed do not appear warranted. Employment of physician assistants and nurse practitioners are not considered in the criteria at this time, both because of questions about how they should be included and because reimbursement regulations tend to make their inclusion counterproductive in terms of increasing services to shortage areas.

> Recommendation 9.
>
> Full-time equivalent dentist estimates should continue to be adjusted for the employment of auxiliaries as at present with no increase in complexity but with corrections as appropriate to reflect more recent data. Nurse practitioners and physician assistants, as well as other medical auxiliaries, should be excluded from current estimates of primary medical care availability until and unless Medicaid/Medicare reimbursement issues under the Rural Health Clinics Act are clearly resolved. However, efforts should be undertaken to determine an appropriate adjustment for their service contribution, for possible future inclusion in the criteria. (Long-term)

o Adjusting physician full-time equivalency counts on the basis of relative productivity of different specialists included in the primary care definition was also considered in this evaluation. Such adjustments could become significant, and will therefore be kept in mind for possible future action. However, their inclusion in the criteria at this time seems unwarranted based on available information, particularly since the data needed to make such adjustments are seldom available for local areas.

o Other adjustments considered were for changes in the primary medical care component of hospital-based physician services. The present inclusion of each medical resident as 0.1 FTE primary care physician seems arbitrary and may not properly reflect the actual extent to which they provide primary care. On the other hand, the present inclusion of the proportion of time full-time hospital staff spend in providing outpatient primary care seems warranted, but no basis currently exists for specifying or verifying any particular proportion nationally. Furthurmore, the criteria contain no adjustment for emergency room care, which thus ignores the substantial amount of primary care obtained in emergency rooms by people in some areas. While the appropriateness of such care is often questioned, it should perhaps be included if a sound basis for estimating the primary care component of emergency room visits can be developed.

> Recommendation 10.
>
> The present flat assignment of 0.1 FTE for the amount of primary care provided by each medical resident should be replaced by a time-related allocation of residents and other hospital-based primary care physicians, where direct measurement is possible. (Long-term)

Recommendation 11.
Efforts to properly measure outpatient primary care provided by hospitals, including that provided through emergency rooms, should be undertaken. If a satisfactory method can be developed, adjustments should be made for the primary medical care provided in such settings. (Long-term)

o The final issue related to estimating practitioner supply is which specialists to include in the primary care category. Many alternative definitions of primary care exist, and the inclusion or exclusion of particular specialists and/or some or all of the care they provide is being widely examined and argued, although little consensus exists. However, the data examined in this study generally do not provide convincing support for changing the current primary care definition used for shortage designation, which includes general and family practitioners, internists, pediatricians and obstetrician gynecologists. This issue needs continuing, careful, and extensive investigation, in relation to shortage designation, if a satisfactory ultimate program resolution is to be reached. The problems in estimating dentist supply are a bit clearer. The available evidence would suggest that most dental specialists should not be included in the estimates of dental care availabilty, since most specialists function largely on a referral basis.

Recommendation 12.
The current definition of primary care physicians is adequate for the purposes of shortage area designation. However, further investigation should be undertaken on the feasibility and appropriateness of including general surgeons in non-metropolitan areas in the definition.

Recommendation 13.
The definition of dentists for designation purposes should be revised to exclude dental practitioners other than general practitioners and pedodontists except where it is specifically shown that they are providing an appreciable amount of general dental care. (Short-term)

Cut-off levels for population-to-practitioner ratios (Chapter V)

o No clearly preferable alternative to the current cut-off (shortage threshold) level for either the overall population-to-primary care physician/ratio or the overall population-to-dentist ratio was identified in this evaluation. Since significant improvements in these ratios have occurred nationally, the current cut-off points (based on earlier data) tend to identify those areas which have not benefited from the national improvements.

Recommendation 14.
No change in the basic population-to-practitioner ratios for designation appears appropriate at this time, except as may be required for dental shortages by implementation of Recommendation 13. However, the distribution of counties by practitioner/population ratios should be monitored carefully so that cut-off levels may be adjusted if it should become appropriate. (Long-term)

Indicators of Need

o The criteria used to measure indicators of high medical need are not entirely satisfactory, and several significant issues should be resolved. The present criteria accept any one of three measures of unmet need. These three measures (poverty, infant mortality and general fertility) are largely uncorrelated. Moreover, the general fertility rate does not appear closely related to unmet need.

Recommendation 15.
The general fertility rate should be dropped from the criteria as an indicator of high unmet need for primary medical care. (Short-term)

Recommendation 16.
Efforts should be undertaken to identify and gain consensus on a single general index of unmet need for use in measuring this concept within areas that meet the availability criteria. The concept should be empirically-based and in terms of measures available currently for all or much of the nation, at least at the county level and if possible for medical service areas. (Long-term)

Indicators of Insufficient Capacity and Unmet Demand (Chapters V, VI)

o The criteria used for insufficient capacity have not been shown to be either conceptually adequate or empirically reliable measures of high levels of unmet demand. Practical experience has also shown that it is very difficult to estimate these measures for proposed shortage areas.

Recommendation 17.
The criteria for insufficient capacity should be retained, but only until a more satisfactory approach for dealing with unmet demand can be developed. Efforts to identify and implement improved indicators of insufficient capacity and unmet demand should continue, with appropriate revision of the criteria to follow. (Long-term)

Population Group/Facilities Criteria (Chapter V)

o The criteria used for population group designations are quite general, utilizing a very basic approach involving application of a single cut-off ratio. This results in some problems, given the wide variety of different special population groups with differing requirements for care. Problems also exist with measurement of the population size involved and the number of practitioners serving that population, as well as with documentation of the access barriers involved. However, guidelines for use in designation of population groups were recently published (Federal Register, November 5, 1981, Part III) which should help clarify the latter situation. The approach used for facilities designations, on the other hand, is general enough to cover any facilities serving designatable areas or population groups.

Recommendation 18.
The criteria should be revised to permit definition of population groups whose needs are such that the standard population-to-practioner ratio applicable to typical populations is inappropriate. (Examples would include the developmentally disabled and other handicapped groups.) A "visits required minus visits supplied" approach should be considered for dealing with these population groups. Additional specialized criteria for designation of specific types of facilities are generally unnecessary and need not be developed, except where facility-specific rather than population group-specific criteria are clearly simpler and therefore preferable.

Guidelines for Use by Applicants

o With the exception of the population group guidelines already mentioned, applicants have no formal guidelines to assist them in development of requests for designation. This means that such requests (which are done by letter and without a formal application form) must be based on the applicant's reading of the criteria themselves, augmented by any discussions they may have with the designation staff, regional office staff, or planning agency staff. Even though the criteria are relatively straightforward, they involve considerable detail.

Recommendation 19.
Guidelines for use by applicants in developing designation requests should be developed, published and made widely available.

Identification of Unmet Demand Expected to Persist for Two Years or More:

(Chapter VI)

o The Congressional charge to evaluate the HMSA criteria and consider alternatives stressed that the use of indicators of unmet demand should be seriously considered, along with the likelihood that such demand would not be met within two years. However, the review and analysis undertaken in preparing this report demonstrated that sound criteria for discriminating among areas according to their levels of unmet demand are not yet available, given the current state-of-the-art and data shortcomings. Similarly, the forces that would lead to a specific area acquiring additional practitioners within a short period such as two years appear to be impossible to identify at this time.

Recommendation 20.
Substantial efforts should be undertaken to develop useful indicators of unmet demand and methods of discriminating among areas with different levels of unmet demand. These efforts should emphasize pragmatic approaches to this designation problem. (Long-term)

o Substantial numbers of NHSC providers are now being allowed to perform their service obligations under the private practice option (PPO), with the practice sites generally being selected by the practitioner based either on the existence of a salaried position or on his/her own analysis of the area's economic base and potential demand. Thus, monitoring NHSC placements (both federally-salaried and PPO) can provide a data base useful for empirical development of means of discriminating among areas having different levels of unmet demand. The information developed could result in progressively more refined indicators for use in future placements and future criteria improvements.

> Recommendation 21.
> In connection with NHSC placements, a research program should be established to systematically collect information on the relative success of private practice option placements and to identify indicators of unmet demand in the areas where placements are made. (Long-term)

Degree-of-Shortage Groups (Chapter VI)

o Existing degree-of-shortage groupings are not satisfactory. They give undue importance to differences in practitioner-to-population ratios and certain measures of unmet need or insufficient capacity; do not consider the size of the affected populations; and do not consider measures of unmet demand and area attractiveness. Coupled with the current policy of making most placements in only two of the four degree-of-shortage groups, this leads to inappropriately large differences in placement eligibility based upon minor differences in area shortage measures. The priority determinations made using these degree-of-shortage groupings also give insufficient consideration to the different characteristics of the various programs utilizing the criteria.

> Recommendation 22.
> The present degree-of-shortage groupings should be restructured so as to not be completely dependent on differences in the level of availability of practitioners and the presence of indicators of high need or insufficient capacity. New groupings should be developed which take into account not only these factors but also measures of unmet need, unmet demand and relative area attractiveness. (Short-term)

> Recommendation 23.
> Priorities among the revised degree-of-shortage groups should be developed separately for federally-salaried NHSC placements, NHSC PPO placements, and other programs utilizing the HMSA criteria. (Short-term)

Existence of Separate Systems for HMSA and MUA Designation

- At the present time, two completely separate programs of shortage area designation exist within the Health Resources and Services Administration: Health Manpower Shortage Area (HMSA) designation, and Medically Underserved Area (MUA) designation. Different PHS programs use these two types of designation to meet different objectives -- the NHSC places personnel in HMSAs, while grant awards to community health centers and urban and rural health initiative primary care programs require MUA designation of the area involved. Each approach uses a different methodology; some overlap, but also considerable differences, exist between the lists produced by the two methodologies, as was discussed in Chapter III. Moreover, the same data and the same service areas are not always used by both, even though both use many of the same indicators.

The same State and local agencies are typically involved in the two types of designation, but different review procedures are used and periodic updates of the two systems are done independently. This not only creates confusion on the part of the public but also makes it necessary for an applicant wishing to obtain both grant funds and NHSC personnel to apply separately through two different designation processes. At one time, primary care HMSA designations were considered automatic MUA designations, but this link was discontinued in October 1980.

> Recommendation 24.
> Efforts should be made to more closely coordinate definitions, service areas, indicators, data, and procedures used in HMSA and MUA designations. Consideration should be given to linking the HMSA and MUA designation processes.

APPENDICES

Appendix A - Criteria for Designation of Health Manpower Shortage Areas; Final Rule

Appendix B - Definitions of Alternative Goals (Types of Shortage)

Appendix C - Measures Used to Identify Alternative Types of Shortage

Appendix D - Analytical Tables for Comparison of HMSA With Alternative Measures

Appendix E - Case Studies of Selected Local Areas

Appendix A. Listing of Small Areas Included in Case Studies

APPENDIX A

federal register

Monday
November 17, 1980

Part IV

Department of Health and Human Services

Public Health Service

Criteria for Designation of Health Manpower Shortage Areas; Final Rule

DEPARTMENT OF HEALTH AND HUMAN SERVICES

Public Health Service

42 CFR Part 5

Criteria for Designation of Health Manpower Shortage Areas

AGENCY: Public Health Service, HHS.

ACTION: Final regulations.

SUMMARY: These regulations set forth the criteria for designation of health manpower shortage areas under section 332 of the Public Health Service Act. Entities in these areas are eligible to apply for assignment of National Health Service Corps Personnel. These areas are also eligible service areas for certain loan repayment, scholarship, and other Public Health Service programs.

EFFECTIVE DATE: These regulations are effective November 17, 1980.

FOR FURTHER INFORMATION CONTACT: Richard C. Lee, Chief, Distribution Studies Branch, Division of Health Professions Analysis, Bureau of Health Professions, Health Resources Administration, Center Building, Room 4-50, 3700 East-West Highway, Hyattsville, Maryland 20782 (301-436-6750).

SUPPLEMENTARY INFORMATION: Section 332 of the Public Health Service Act ("the Act"), as amended by Pub. L. 94-484, the Health Professions Educational Assistance Act of 1976, required that the Secretary of Health, Education, and Welfare establish, by regulation, criteria for the designation of health manpower shortage areas. In the **Federal Register** of January 10, 1978 (43 FR 1586), the Department published interim-final regulations for designating health manpower shortage areas as a new Part 5 of Title 42 of the Code of Federal Regulations. Those regulations established criteria for the designation of shortage areas for seven different types of health manpower, including primary medical, dental, psychiatric, vision, podiatric, pharmacy, and veterinary care. The Department then compared available data on areas throughout the country with these criteria and developed preliminary listings of areas which appeared to meet the criteria. In accordance with section 332(c) of the Act and the interim-final regulations, the Department submitted these preliminary listings, as well as individual requests for the designation of areas, population groups or facilities, to the appropriate health systems agencies (HSA's), state health planning and development agencies (SHPDA's), and state governors for their review and recommendations.

As a result of Departmental evaluation of these reviews and of individual requests for designation, the Secretary has designated more than 5,000 health manpower shortage areas of various types. The first comprehensive list of health manpower shortage areas was published July 17, 1978 (43 FR 30648). Updated lists of shortage areas for primary medical care and dental care manpower were published September 28 and December 29, 1978, respectively (43 FR 44758, 43 FR 61164). Additional comprehensive lists of all health manpower shortage areas were published on August 6, 1979 (44 FR 46183) and August 28, 1980 (45 FR 57002).

Due to the statutory deadline for publication of these regulations and the dependence of various programs under the PHS Act on the designation of health manpower shortage areas, the regulations were issued on January 10, 1978, as interim-final regulations, without the benefit of proposed rulemaking procedures. However, interested persons were invited to submit comments no later than February 24, 1978. Following the close of the comment period, the regulations were to be revised as warranted by public comments received.

Sixty-one letters were received within the comment period. A detailed discussion of the comments, the Department's response to the comments, and the revisions made in the regulations are presented below.

The changes contained in the final regulations and discussed below are relatively minor. Some further, more substantial, changes and additions appear desirable as a result of problems which have arisen in the process of interpreting and applying the criteria, suggestions made in an evaluation study of the criteria, and additional distribution studies and criteria development efforts which have been carried out since the time when the interim-final criteria were developed. Consequently, proposed amendments to these final regulations will be set forth in a Notice of Proposed Rulemaking to be published at a later date.

Discussion of Comments and Revisions

Some suggestions made in the comments could not be adopted because they contradicted specific requirements in the statute. These include a suggestion that the criteria be based upon demand rather than need; the legislation specifically requires that need be considered in designation. Another example is those comments that criticized the special provision in the criteria for designation of American Indians—in spite of the fact that the legislation specifically provides for designation of facilities serving Indians.

The comments and responses discussed are arranged according to the numbers and titles of the sections of the interim-final regulations to which they pertain.

5.3 Procedures for designation of health manpower shortage areas. The Department has revised the procedures for designating health manpower shortage areas to reflect the fact that the initial designations have already been made, under the interim-final regulations. The procedures now emphasize the annual review of the lists of shortage areas, together with the processing of individual designation requests. In response to comments from health systems agencies and state health planning and development agencies about the inadequacy of the 60-day period which was provided for review of initial preliminary lists of shortage areas, the Department has lengthened the review period provided those agencies in connection with the annual review to 90 days.

A few comments were received suggesting that affected State and local professional societies be included in the formal review and comment process for all proposed designations. The original regulations did not include review by these societies for three reasons: (1) Representatives of these professionals, many of whom are members of the societies, should already be involved in health systems agency (HSA) and/or state health planning and development agency (SHPDA) activities, either through governing body membership or other relationships; (2) the addition of other groups to the formal process appeared likely to further lengthen what is already a fairly lengthy review process; and (3) the comments of professional societies are already required to be considered in the review of National Health Service Crops (NHSC) site applications (under section 333(c) of the Public Health Service Act).

However, in a number of cases, professional societies or their members have challenged a designation after it has been made, resulting in either a later withdrawal of the designation or a delay in the implementation of the designation until the question raised could be resolved. For these reasons, the regulations have been revised to provide that the Department will make copies of proposed designations available to interested parties, upon request, before the designations are made. This policy has already been implemented for

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certain State-level health professional societies which have expressed interest.

One respondent suggested that the HSA or SHPDA staff should be required to make a site visit to areas or facilities proposed for designation. The Department has no authority to impose such a requirement upon HSA's or SHPDA's. Furthermore, this proposed requirement would not always be appropriate; a site visit would probably be more beneficial during development or review of a designated area's application for National Health Service Corps personnel or for grant funding.

One respondent suggested that the SHPDA be given a coordinating role among HSA's within its State and responsibility for assigning priorities among designated areas. This suggestion was not adopted for the following reasons: (1) The need for priority determinations to be objective and consistent nationally; (2) this proposal is not within the scope of regulations implementing section 332; and (3) a concern that this suggested function might conflict with the statutory role assigned to the HSA. It should be noted that section 332(c)(1) requires recommendations by a SHPDA *only* with respect to a health service area for which no HSA has been designated. The Secretary has decided, however, to seek comments from the appropriate SHPDA as a routine matter in all cases. The regulations reflect that policy decision.

A question was raised regarding the length of time for processing of a designation request. Although this matter is not dealt with in the regulations, every effort will be made to complete action on each request for designation within 30 days after receipt of all the information necessary for such action. Since this necessary information includes the comments and recommendations provided by HSA's and others, and the regulations provide a 30-day period for submission of those comments, action on individual requests will normally take approximately 60 days from receipt of the initial request.

Notification of Designation (or Withdrawal)

Some respondents suggested that State and/or local health professional societies be specifically identified in the regulations as agencies and entities automatically notified of designations in their area. No change in the regulations has been made on this point, since the regulations already provide for the notification of public or non-profit private entities with a demonstrated interest in the area designated. The Department will continue to send copies of designation notification letters not only to HSA's, SHPDA's, and Governors, but also to other parties who have expressed interest in specific cases, and will normally provide copies automatically to affected State-level health professions societies. In addition, the Department will encourage the health systems agencies to publicize designations within their service areas to improve awareness of the designations on the part of local organizations and individuals concerned with health care delivery.

It should be noted that, although the statute and therefore the regulations provide 60 days after designation for notification, the Department attempts to notify all interested parties at the time of designation.

A provision has also been added to make clear that the effective date of the designation of an area is the date of the notification letter to the requesting individual or agency, which normally precedes the date of first publication in the **Federal Register.**

The section title and content have been expanded to deal with the issue of withdrawal of designations and the concomitant problem of stability of the list. Once a designation has been made, applicants for Public Health Service and related programs and reviewers of these applications depend on that designation as an eligibility requirement and a means of establishing priorities among applicants. If all appropriate parties have had a chance to comment on the proposed designation, and if the fact of designation of the area has been published in the **Federal Register,** it is unfair to potential applicants to be subject to possible withdrawal of the designation at any moment. For this reason, the regulations have been revised to indicate that any withdrawals will be effective only upon publication of a notice of withdrawal (or a new list which does not contain the area) in the **Federal Register.** New lists will typically be published annually.

Appendices

A number of comments received addressed items which appeared in more than one appendix. These broad comments and the corresponding changes are discussed below, according to subject matter. Items specific to individual appendices are discussed by manpower type.

Rational Service Areas

One respondent suggested that locally developed planning area boundaries should be used in defining rational service areas. The Department supports this concept. However, no change has been made in the provision since the existing criteria can accommodate local planning areas, where appropriate.

Another respondent suggested that the same boundaries should be used in determining primary medical care and dental service areas. This suggestion has not been adopted as a general rule, because the service area drawn from and population served by primary medical and dental practices are not necessarily the same. However, where appropriate for particular cases, identical service areas for medical and dental designations can and will be considered.

A number of comments were received concerning the consistency and appropriateness of distances corresponding to criteria travel times. In response to these comments, the Department reviewed the distances for consistency, particularly in terms of speeds assumed for specific types of terrain. Distances corresponding to 40-minute travel time were reduced to be consistent with approximately 40 mph under normal conditions, 30 mph in mountainous terrain, and 50 mph in flat terrain. The previous 60-minute travel time standard for veterinarians was reduced to 40 minutes to ally concern that 60 minutes assumes an excessive amount of time spent traveling by the veterinarians.

It was also suggested that the criteria should explicitly mention that these distances may be reduced in areas of heavy traffic or severe weather conditions. Although this particular revision has not been made, the mileages specified are now referred to as "guidelines" in determining distances, to clarify that local estimates of mileage equivalents to the specified travel times are allowable.

One respondent suggested that, in metropolitan areas, one fare zone be used as an alternative to a specific travel time; this has not been done, because fare zone definitions (and price differentials among fare zones) differ widely from city to city. For example, travel through a single zone in some cities would require considerably more than 30 or 40 minutes travel time.

Some respondents suggested that a specific definition of "primary or secondary roads" and a discussion of methods for defining rational service areas in urban areas be provided. In order to minimize the length and complexity of the regulations, and due to concern that detailed specifications would not be applicable to every local situation, these have not been added to the regulations. However, the Department will provide guidelines covering these points.

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One respondent requested that clearer distinctions be made between urban geographic areas and urban population groups. An effort has been made to clarify this by stating that population group designations are appropriate where access barriers within an area prevent a population group from using the area's primary medical providers.

Population Counts

Some respondents noted that age-group adjustments for populations requiring dental and psychiatric services have not been included. This is because it is not clear that the needs for these services differ significantly enough by age to warrant these adjustments.

The adjustments to the population for the health service requirements of tourists have been modified. A lower weight of 0.25 has been applied in computing tourist contributions to the area population for purposes of primary care need, and the tourist contribution has been eliminated for purposes of dental care needs. These changes reflect questions that have been raised about the appropriateness of the Federal role in effectively subsidizing services for tourists, the fact that most tourist health service requirements are for emergency care rather than primary care, and the fact that dental care in particular is almost always scheduled in advanced, in or near the individual's residential area. At the same time, however, provision has been made for counting seasonal residents, i.e., those who maintain a residence in the area and inhabit it for 2 to 8 months per year.

Counting of Number of Practitioners

1. *General.* The Department has revised these provisions to clarify the methods for determination of full-time equivalents (F.T.E.'s) in counting practitioners.

A suggestion that practitioners working in excess of 40 hours per week be counted as more than 1 F.T.E. has not been accepted since this would tend to prevent designation and possible subsequent relief in areas where practitioners are forced to work added hours because of manpower shortages.

Some respondents noted that age adjustments were made in counting some types of practitioners (dentists, optometrists, podiatrists), but not all. Age adjustments were included for those health manpower types whose productivity has been shown to be affected strongly by age. There was no evidence of such age-related productivity differentials for pharmacists and veterinarians, and age-specific practitioner data for these two types are also not widely available. The situation for primary care physicians is considerably more complicated, because productivity differences across specialties seem to be more significant than those across age groups. Possible refinement of the primary care practitioner counts based on productivity considerations is still being studied.

2. *Primary care.* The equivalency level of interns and residents has been reduced to 0.1 F.T.E. to reflect more closely their productivity and the amount of their time spent in ambulatory, primary care services.

Comments supporting both higher and lower weights for foreign medical graduates (F.M.G.'s) were received, and no significant changes have been made. Due to the changes in immigration policy effected by Pub. L. 94–484, F.M.G.'s entering training positions do not represent potential additions to the permanent supply of physicians in the area and, therefore, are excluded. One respondent pointed out that adjustments for F.M.G.'s were not specifically included for facilities; this has been corrected.

A change in the procedure for physician counts has been added to implement an amendment to section 332 made by the Medicare-Medicaid Anti-Fraud and Abuse Amendments (Pub. L. 95–142). The legislation required that, for areas where physicians have been suspended from participation in the Medicare and Medicaid programs designation decisions should reflect the extent to which entitled individuals cannot obtain services under those programs as a result.

The reference to considering the contribution of nurse practitioners and physician assistants in counting primary care practitioners has been deleted both because no method for these adjustments has been developed and due to implications of the Rural Health Clinic Service Act (Pub. L. 95–210). Specifically, explicit inclusion of nurse practitioners and physician assistants in the determination of the area's provider supply would tend to prevent areas where these practitioners operate from being designated. This could preclude their reimbursement under the Rural Health Clinic Service Act, which limits reimbursement to facilities in health manpower shortage areas or in medically underserved areas. The fact that counts of nurse practitioners and physician assistants are not included in the determination of shortage areas does not prevent their participation in the various shortage area programs.

3. *Dental.* A number of comments were received on the appropriateness of the various weights used in determining the supply of F.T.E. dentists. Some respondents criticized the fact that the base weight of 1.0 F.T.E. reflects the productivity of the dentist under age 55 who employs one auxiliary, instead of reflecting the productivity of one dentist working alone. This was done because the average dentist has one auxiliary. (It should be pointed out that the shortage ratios and degree-of-shortage groups which were selected reflect this base productivity and would have to be changed correspondingly if the base weight were changed; such changes, taken together, would not affect what areas are actually designated.) The weights used have been rounded to the nearest tenth in response to criticism that the distinctions made originally were too fine.

Some respondents pointed out that dental hygienists and other dental assistants should not be equated with receptionists and other clerical staff in counting auxiliaries. However, no change in the definition of auxiliaries for the calculation of adjustments has been made at this time because no data are available on which to base differential productivity figures for different staff. Further, it is not clear that this distinction would produce significant differences in the determinations.

4. *Psychiatric.* Some comments were received suggesting that the category of "psychiatric manpower shortage areas" be changed to "mental health manpower shortage areas," and that corresponding changes be made within the criteria themselves. In particular, the concern was that clinical psychologists, psychiatric nurses, and psychiatric social workers should be included in counting practitioners for designating these areas.

This approach was considered at the time of the development of the original criteria. However, no consensus could be reached upon the appropriate basis for relating these manpower types to psychiatrists in a weighted count of manpower available to meet mental health needs. In addition, the major anticipated use of the designations under Appendix C was placement of psychiatrists. While no integrated mental health manpower approach has yet been developed, this matter is now under further study in connection with an effort to develop criteria for areas with shortages of psychologists, psychiatric nurses, and psychiatric social workers, for use in the event that proposed legislation is enacted requiring obligated service in return for National Institute of Mental Health training of these personnel. It is anticipated that criteria for these types of personnel

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would overlap with, but not be the same as, those for the psychiatric shortage areas. For these reasons, no change is being made at this time.

The original reference in the regulations to considering the contribution of other mental health providers has been deleted, since no explicit way for taking these practitioners into account has been developed. This deletion should not prevent placement of these providers in designated psychiatric shortage areas.

Population-to-Practitioner Ratio Criteria

1. *Primary care.* A number of comments have been received, particularly in the course of discussions in regional workshops, to the effect that the criteria in the regulations contain many provisions which have made designation easier for inner-city urban areas, as compared to the designation of some low-density rural areas which are more isolated. At the same time, a number of specific cases have arisen regarding rural areas which have less than adequate services, but do not have shortages severe enough to justify designation under these criteria or the criteria for medically underserved areas, and therefore cannot be certified for reimbursement of the services of nurse practitioners and physician assistants under the Rural Health Clinic Services Act. Therefore, a new category of primary care shortage areas is under consideration for rural areas whose ratios of population to number of primary care physicians are below the previous qualifying ratios. This matter will be dealt with in the later Notice of Proposed Rulemaking setting forth various proposed amendments to this final regulation.

2. *Dental.* Comments suggesting that the ratio criteria should be more stringent were received from dental associations, while a health planner suggested that less stringent criteria might be appropriate. The original ratio was retained because of its consistency with the levels applied to other health manpower types.

3. *Psychiatric.* Concern was expressed by provider groups that the ratio of population to number of psychiatrists used as a shortage criterion was too high; however, because any significant lowering of this ratio would appear to lead to inclusion of almost all U.S. mental health catchment areas, no change has been made, in order to continue to distinguish those areas with severe shortages.

4. *Vision care; podiatric care; veterinary care.* Some significant changes to these criteria will be proposed in the later Notice of Proposed Rulemaking.

High Need Standards

Concerns were expressed about methods for assuring statistical significance of the data used in establishing high need. These considerations represent too fine a level of technical detail to be addressed in the regulations, but will be addressed in guidelines to be issued on the preparation of designation requests.

The poverty level rates used in determining high needs for primary medical, dental, and psychiatric designations have been reduced from 30 to 20 percent, for consistency with definitions used by the Bureau of the Census in defining poverty areas. Consideration was given to reducing the infant mortality rate used in determining high needs from 20 to 18, for consistency with draft National Health Planning Guidelines. However, this would increase conflict with the current Bureau of Community Health Services methodology for designation of high infant mortality areas, which uses a level of 22.1. Therefore, no change has been made at this time.

In the case of dental designations, the definition of a lack of fluoridated water for use as indicating high dental need has been clarified. The suggestion that prevalence of edentulous persons or of periodontal disease be included as a high need indicator has not been adopted because data on these variables are not widely available.

Additional suggested indicators of high need for psychiatric care (such as suicides, homicides, juvenile delinquency rates, drug program admissions, drug sales, drug deaths, etc.) have not been added due to lack of availability of consistent supporting data. The heroin prevalence index has also been deleted because data are available only on a very limited basis.

High need indicators for vision care manpower have not been included because the major adjustments for need are already included as population age adjustments.

Insufficient Capacity Indicators

Considerable concern was expressed about the difficulty of obtaining data on the insufficient capacity indicators. In addition, no geographic areas have received designation on the basis of these indicators during the first year of use of these criteria. At the same time, however, a number of comments recommended that greater flexibility be exercised in the determination of "high needs." The insufficient capacity indicators have been retained because they provide alternative means of identifying areas with special access problems.

Contiguous Area Considerations

Comments received regarding the distances specified for travel times to contiguous areas are discussed above under comments on service areas. A change has been made in the ratio of population to number of primary care physicians used to indicate overutilization of primary care resources in contiguous areas; this ratio has been lowered to 2000:1, for consistency with the adequacy level proposed in draft National Health Planning Guidelines and used in Departmental primary care physician requirements estimates.

Population Group Designations

The format of the population group section has been changed in an effort to clarify it. A specific provision for designation of migrant and seasonal farmworkers in high impact areas is under consideration, as are specific criteria for designation of low income populations. These will be dealt with in the later Notice of Proposed Rulemaking in response to a significant number of requests for designation of these types of populations.

The category of population groups has not been limited to socioeconomic groups, as suggested by one respondent, because this definition would not recognize all persons with serious access problems.

Facility Criteria

The criteria for designation of State mental hospitals have been modified (from 600 workload units per psychiatrist to 300) to reflect considerable concern which was expressed during the comment period about the inability to obtain minimal staffing ratios under the existing State mental hospital criteria. Information provided indicated that hospitals with ratios in excess of 300 : 1 frequently were so short of manpower that they were unable to obtain accreditation.

Degree of Shortage Groups

One respondent suggested that the Secretary give an individual ranking for each shortage area. This is not feasible, since these rankings would change each time a new area was added to the list. The degree-of-shortage group for each designated area is included in the notification of designation and in **Federal Register** publications.

All references to ranking of areas within a specific degree-of-shortage group have been deleted since it was determined that this ranking would not

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be a significant consideration in determining relative priorities for NHSC personnel, or for other PHS programs.

Various changes of an editorial or technical nature have also been made to clarify the regulations.

Accordingly, Part 5 of 42 CFR is revised as set forth below.

Dated: September 12, 1980.

Julius B. Richmond,

Assistant Secretary for Health.

Approved: October 31, 1980.

Patricia Roberts Harris,

Secretary.

PART 5—DESIGNATION OF HEALTH MANPOWER SHORTAGE AREAS

Sec.
5.1 Purpose.
5.2 Definitions.
5.3 Procedure for designation of health manpower shortage areas.
5.4 Notification and publication of designations and withdrawals.
Appendix A. Criteria for Designation of Areas having Shortages of Primary Medical Care Manpower.
Appendix B. Criteria for Designation of Areas having Shortages of Dental Manpower.
Appendix C. Criteria for Designation of Areas having Shortages of Psychiatric Manpower.
Appendix D. Criteria for Designation of Areas having Shortages of Vision Care Manpower.
Appendix E. Criteria for Designation of Areas having Shortages of Podiatric Manpower.
Appendix F. Criteria for Designation of Areas having Shortages of Pharmacy Manpower.
Appendix G. Criteria for Designation of Areas having Shortages of Veterinary Manpower.

Authority: Section 215 of the Public Health Service Act, 58 Stat. 690 (42 U.S.C. 216); Section 332 of the Public Health Service Act, 90 Stat. 2770–2772 (42 U.S.C. 254e).

§ 5.1 Purpose.

These regulations establish criteria and procedures for the designation of geographic areas, population groups, medical facilities, and other public facilities, in the States, as health manpower shortage areas.

§ 5.2 Definitions.

"Act" means the Public Health Service Act, as amended.

"Health manpower shortage area" means any of the following which the Secretary determines has a shortage of health manpower: (1) An urban or rural area (which need not conform to the geographic boundaries of a political subdivision and which is a rational area for the delivery of health services); (2) a population group; or (3) a public or nonprofit private medical facility.

"Health service area" means a health service area whose boundaries have been designated by the Secretary, under section 1511 of the Act, for purposes of health planning activities.

"Health systems agency" or "HSA" means the health systems agency designated, under section 1515 of the Act, to carry out health planning activities for a specific health service area.

"Medical facility" means a facility for the delivery of health services and includes: (1) A community health center, public health center, outpatient medical facility, or community mental health center; (2) a hospital, State mental hospital, facility for long-term care, or rehabilitation facility; (3) a migrant health center or an Indian Health service facility; (4) a facility for delivery of health services to inmates in a U.S. penal or correctional institution (under section 323 of the Act) or a State correctional institution; (5) a Public Health Service medical facility (used in connection with the delivery of health services under section 320, 321, 322, 324, 325, or 326 of the Act); or (6) any other Federal medical facility.

"Metropolitan area" means an area which has been designated by the Office of Management and Budget as a standard metropolitan statistical area (SMSA). All other areas are "non-metropolitan areas."

"Poverty level" means the povery level as defined by the Bureau of the Census, using the poverty index adopted by a Federal Interagency Committee in 1969, and updated each year to reflect changes in the Consumer Price Index.

"Secretary" means the Secretary of Health and Human Services and any other officer or employee of the Department to whom the authority involved has been delegated.

"State" includes, in addition to the several States, the District of Columbia, the Commonwealth of Puerto Rico, the Northern Mariana Islands, the Virgin Islands, Guam, American Samoa, and the Trust Territory of the Pacific Islands.

"State health planning and development agency" or "SHPDA" means a State health planning and development agency designated under section 1521 of the Act.

§ 5.3 Procedures for designation of health manpower shortage areas.

(a) Using data available to the Department from national, State, and local sources and based upon the criteria in the Appendices to this part, the Department will annually prepare listings (by State and health service area) of currently designated health manpower shortage areas and potentially designatable areas, together with appropriate related data available to the Department. Relevant portions of this material will then be forwarded to each health systems agency, State health planning and development agency, and Governor, who will be asked to review the listings for their State, correct any errors of which they are aware, and offer their recommendations, if any, within 90 days, as to which geographic areas, population groups, and facilities in areas under their jurisdiction should be designated. An information copy of these listings will also be made available, upon request, to interested parties for their use in providing comments or recommendations to the Secretary and/or to the appropriate HSA, SHPDA, or Governor.

(b) In addition, any agency or individual may request the Secretary to designate (or withdraw the designation of) a particular geographic area, population group, or facility as a health manpower shortage area. Each request will be forwarded by the Secretary to the appropriate HSA, SHPDA, and Governor, who will be asked to review it and offer their recommendations, if any, within 30 days. An information copy will also be made available to other interested parties, upon request, for their use in providing comments or recommendations to the Secretary and/or to the appropriate HSA, SHPDA, or Governor.

(c) In each case where the designation of a public facility (including a Federal medical facility) is under consideration, the Secretary will give written notice of the proposed designation to the chief administrative officer of the facility, who will be asked to review it and offer their recommendations, if any, within 30 days.

(d) After review of the available information and consideration of the comments and recommendations submitted, the Secretary will designate health manpower shortage areas and withdraw the designation of any areas which have been determined no longer to have a shortage of health manpower.

§ 5.4 Notification and publication of designations and withdrawals.

(a) The Secretary will give written notice of the designation (or withdrawal of designation) of a health manpower shortage area, not later than 60 days from the date of the designation (or withdrawal of designation), to:

(1) The Governor of each State in which the area, population group, medical facility, or other public facility so designated is in whole or in part located;

(2) Each HSA for a health service area which includes all or any part of the

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area, population group, medical facility, or other public facility so designated;

(3) The SHPDA for each State in which the area, population group, medical facility, or other public facility so designated is in whole or in part located; and

(4) Appropriate public or nonprofit private entities which are located in or which have a demonstrated interest in the area so designated.

(b) The Secretary will periodically publish updated lists of designated health manpower shortage areas in the Federal Register, by type of manpower shortage. An updated list of areas for each type of manpower shortage will be published at least once annually.

(c) The effective date of the designation of an area shall be the date of the notification letter to the individual or agency which requested the designation, or the date of publication in the **Federal Register**, whichever comes first.

(d) Once an area is listed in the **Federal Register** as a designated health manpower shortage area, the effective date of any later withdrawal of the area's designation shall be the date when notification of the withdrawal, or an updated list of designated areas which does not include it, is published in the **Federal Register**.

Appendix A—Criteria for Designation of Areas Having Shortages of Primary Medical Care Manpower

Part I—Geographic Areas

A. Criteria.

A geographic area will be designated as having a shortage of primary medical care manpower if the following three criteria are met:

1. The area is a rational area for the delivery of primary medical care services.

2. One of the following conditions prevails within the area:

(a) The area has a population to full-time-equivalent primary care physician ratio of at least 3,500 : 1.

(b) The area has a population to full-time-equivalent primary care physician ratio of less than 3,500 : 1 but greater than 3,000 : 1 and has unusually high needs for primary care services or insufficient capacity of existing primary care providers.

3. Primary medical care manpower in contiguous areas are overutilized, excessively distant, or inaccessible to the population of the area under consideration.

B. *Methodology.*

In determining whether an area meets the criteria established by paragraph A of this part, the following methodology will be used:

1. *Rational Areas for the Delivery of Primary Medical Care Services.*

(a) The following areas will be considered rational areas for the delivery of primary medical care services:

(i) A county, or a group of contiguous counties whose population centers are within 30 minutes travel time of each other.

(ii) A portion of a county, or an area made up of portions of more than one county, whose population, because of topography, market or transportation patterns, distinctive population characteristics or other factors, has limited access to contiguous area resources, as measured generally by a travel time greater than 30 minutes to such resources.

(iii) Established neighborhoods and communities within metropolitan areas which display a strong self-identity (as indicated by a homogeneous socioeconomic or demographic structure and/or a tradition of interaction or interdependency), have limited interaction with contiguous areas, and which, in general, have a minimum population of 20,000.

(b) The following distances will be used as guidelines in determining distances corresponding to 30 minutes travel time:

(i) Under normal conditions with primary roads available: 20 miles.

(ii) In mountainous terrain or in areas with only secondary roads available: 15 miles.

(iii) In flat terrain or in areas connected by interstate highways: 25 miles.

Within inner portions of metropolitan areas, information on the public transportation system will be used to determine the distance corresponding to 30 minutes travel time.

2. *Population Count.*

The population count used will be the total permanent resident civilian population of the area, excluding inmates of institutions, with the following adjustments, where appropriate:

(a) Adjustments to the population for the differing health service requirements of various age-sex population groups will be computed using the table below of visit rates for 12 age-sex population cohorts. The total expected visit rate will first be obtained by multiplying each of the 12 visit rates in the table by the size of the area population within that particular age-sex cohort and adding the resultant 12 visit figures together. This total expected visit rate will then be divided by the U.S. average per capita visit rate of 5.1, to obtain the adjusted population for the area.

Sex	Age groups					
	Under 5	5–14	15–24	25–44	45–64	65 and over
Male	7.3	3.6	3.3	3.6	4.7	6.4
Female	6.4	3.2	5.5	5.4	6.5	6.8

(b) The effect of transient populations on the need of an area for primary care manpower will be taken into account as follows:

(i) Seasonal residents, i.e., those who maintain a residence in the area but inhabit it for only 2 to 8 months per year, may be included but must be weighted in proportion to the fraction of the year they are present in the area.

(ii) Other tourists (non-resident) may be included in an area's population but only with a weight of 0.25, using the following formula: Effective tourist contribution to population = 0.25 × (fraction of year tourists are present in area) × (average daily number of tourists during portion of year that tourists are present).

(iii) Migratory workers and their families may be included in an area's population, using the following formula: Effective migrant contribution to population = (fraction of year migrants are present in area) × (average daily number of migrants during portion of year that migrants are present).

3. *Counting of Primary Care Practitioners.*

(a) All non-Federal doctors of medicine (M.D.) and doctors of osteopathy (D.O.) providing direct patient care who practice principally in one of the four primary care specialities—general or family practice, general internal medicine, pediatrics, and obstetrics and gynecology—will be counted. Those physicians engaged solely in administration, research, and teaching will be excluded. Adjustments for the following factors will be made in

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computing the number of full-time-equivalent (FTE) primary care physicians:

(i) Interns and residents will be counted as 0.1 full-time equivalent (FTE) physicians.

(ii) Graduates of foreign medical schools who are not citizens or lawful permanent residents of the United States will be excluded from physician counts.

(iii) Those graduates of foreign medical schools who are citizens or lawful permanent residents of the United States, but do not have unrestricted licenses to practice medicine, will be counted as 0.5 FTE physicians.

(iv) Practitioners who are semi-retired, who operate a reduced practice due to infirmity or other limiting conditions, or who provide patient care services to the residents of the area only on a part-time basis will be discounted through the use of full-time equivalency figures. A 40-hour work week will be used as the standard for determining full-time equivalents in these cases. For practitioners working less than a 40-hour week, every four (4) hours (or ½ day) spent providing patient care, in either ambulatory or inpatient settings, will be counted as 0.1 FTE (with numbers obtained for FTE's rounded to the nearest 0.1 FTE), and each physician providing patient care 40 or more hours a week will be counted as 1.0 FTE physician. (For cases where data are available only for the number of hours providing patient care in office settings, equivalencies will be provided in guidelines.)

(c) In some cases, physicians located within an area may not be accessible to the population of the area under consideration. Allowances for physicians with restricted practices can be made, on a case-by-case basis. However, where only a portion of the population of the area cannot access existing primary care resources in the area, a population group designation may be more appropriate (see Part II of this Appendix).

(d) Hospital staff physicians involved exclusively in inpatient care will be excluded. The number of full-time equivalent physicians practicing in organized outpatient departments and primary care clinics will be included, but those in emergency rooms will be excluded.

(e) Physicians who are suspended under provisions of the Medicare-Medicaid Anti-Fraud and Abuse Act for a period of eighteen months or more will be excluded.

4. *Determination of Unusually High Needs for Primary Medical Care Services.*

An area will be considered as having unusually high needs for primary health care services if at least one of the following criteria is met:

(a) The area has more than 100 births per year per 1,000 women aged 15–44.

(b) The area has more than 20 infant deaths per 1,000 live births.

(c) More than 20% of the population (or of all households) have incomes below the poverty level.

5. *Determination of Insufficient Capacity of Existing Primary Care Providers.*

An area's existing primary care providers will be considered to have insufficient capacity if at least two of the following criteria are met:

(a) More than 8,000 office or outpatient visits per year per FTE primary care physician serving the area.

(b) Unusually long waits for appointments for routine medical services (i.e., more than 7 days for established patients and 14 days for new patients).

(c) Excessive average waiting time at primary care providers (longer than one hour where patients have appointments or two hours where patients are treated on a first-come, first-served basis).

(d) Evidence of excessive use of emergency room facilities for routine primary care.

(e) A substantial proportion (2/3 or more) of the area's physicians do not accept new patients.

(f) Abnormally low utilization of health services, as indicated by an average of 2.0 or less office visits per year on the part of the area's population.

6. *Contiguous Area Considerations.*

Primary care manpower in areas contiguous to an area being considered for designation will be considered excessively distant, overutilized or inaccessible to the population of the area under consideration if one of the following conditions prevails in each contiguous area:

(a) Primary care manpower in the contiguous area are more than 30 minutes travel time from the population center(s) of the area being considered for designation (measured in accordance with paragraph B.1(b) of this Part).

(b) The contiguous area population-to-full-time-equivalent primary care physician ratio is in excess of 2000:1, indicating that practitioners in the contiguous area cannot be expected to help alleviate the shortage situation in the area being considered for designation.

(c) Primary care manpower in the contiguous area are inaccessible to the population of the area under consideration because of specified access barriers, such as:

(i) Significant differences between the demographic (or socio-economic) characteristics of the area under consideration and those of the contiguous area, indicating that the population of the area under consideration may be effectively isolated from nearby resources. This isolation could be indicated, for example, by an unusually high proportion of non-English-speaking persons.

(ii) A lack of economic access to contiguous area resources, as indicated particularly where a very high proportion of the population of the area under consideration is poor (i.e., where more than 20 percent of the population or the households have incomes below the poverty level), and Medicaid-covered or public primary care services are not available in the contiguous area.

C. *Determination of Degree of Shortage.*

Designated areas will be assigned to degree-of-shortage groups, based on the ratio (R) of population to number of full-time equivalent primary care physicians and the presence or absence of unusually high needs for primary health care services, according to the following table:

	High needs not indicated	High needs indicated
Group 1	No physicians	No physicians; or R≥5,000
Group 2	R≥5,000	5,000>R≥4,000
Group 3	5,000>R≥4,000	4,000>R≥3,500
Group 4	4,000>R≥3,500	3,500>R≥3,000

Part II—Population Groups

A. *Criteria.*

1. In general, specific population groups within particular geographic areas will be designated as having a shortage of primary medical care manpower if the following three criteria are met:

(a) The area in which they reside is rational for the delivery of primary medical care services, as defined in paragraph B.1 of Part I of this Appendix.

(b) Access barriers prevent the population group from use of the area's primary medical care providers. Such barriers may be economic, linguistic, cultural, or architectural, or could involve refusal of some providers to accept certain types of patients or to accept Medicaid reimbursement.

(c) The ratio of the number of persons in the population group to the number of primary care physicians practicing in

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the area and serving the population group is at least 3.000 : 1.

2. Indians and Alaska Natives will be considered for designation as having shortages of primary care manpower as follows:

(a) Groups of members of Indian tribes (as defined in section 4(d) of Pub. L. 94–437, the Indian Health Care Improvement Act of 1976) are automatically designated.

(b) Other groups of Indians or Alaska Natives (as defined in section 4(c) of Pub. L. 94–437) will be designated if the general criteria in paragraph A are met.

B. *Determination of Degree of Shortage.*

Each designated population group will be assigned to a degree-of-shortage group, based on the ratio (R) of the group's population to the number of primary care physicians serving it, as follows:

Group 1—No physicians or $R \geq 5.000$.
Group 2—$5.000 > R \geq 4.000$.
Group 3—$4.000 > R \geq 3.500$.
Group 4—$3.500 > R \geq 3.000$.

Population groups which have received "automatic" designation will be assigned to degree-of-shortage group 4 if no information on the ratio of the number of persons in the group to the number of FTE primary care physicians serving them is provided.

PART III—Facilities

A. *Federal and State Correctional Institutions.*

1. *Criteria.*

Medium to maximum security Federal and State correctional institutions and youth detention facilities will be designated as having a shortage of primary medical care manpower if both the following criteria are met:

(a) The institution has at least 250 inmates.

(b) The ratio of the number of internees per year to the number of FTE primary care physicians serving the institution is at least 1.000:1. (Here the number of internees is the number of inmates present at the beginning of the year plus the number of new inmates entering the institution during the year, including those who left before the end of the year; the number of FTE primary care physicians is computed as in Part I, Section B, paragraph 3 above.)

2. *Determination of Degree of Shortage.*

Designated correctional institutions will be assigned to degree-of-shortage groups based on the number of inmates and/or the ratio (R) of internees to primary care physicians, as follows:

Group 1—Institutions with 500 or more inmates and no physicians.
Group 2—Other institutions with no physicians and institutions with $R \geq 2.000$.
Group 3—Institutions with $2.000 > R \geq 1.000$.

B. *Public or Non-Profit Medical Facilities.*

1. *Criteria.*

Public or non-profit private medical facilities will be designated as having a shortage of primary medical care manpower if:

(a) the facility is providing primary medical care services to an area or population group designated as having a primary care manpower shortage; and

(b) the facility has insufficient capacity to meet the primary care needs of that area or population group.

2. *Methodology.*

In determining whether public or nonprofit private medical facilities meet the criteria established by paragraph B.1 of this Part, the following methodology will be used:

(a) *Provision of Services to a Designated Area or Population Group.*

A facility will be considered to be providing services to a designated area or population group if either:

(i) A majority of the facility's primary care services are being provided to residents of designated primary care manpower shortage areas or to population groups designated as having a shortage of primary care manpower; or

(ii) The population within a designated primary care shortage area or population group has reasonable access to primary care services provided at the facility. Reasonable access will be assumed if the area within which the population resides lies within 30 minutes travel time of the facility and non-physical barriers (relating to demographic and socioeconomic characteristics of the population) do not prevent the population from receiving care at the facility.

Migrant health centers (as defined in section 319(a)(1) of the Act) which are located in areas with designated migrant population groups and Indian Health Service facilities are assumed to be meeting this requirement.

(b) *Insufficient capacity to meet primary care needs.*

A facility will be considered to have insufficient capacity to meet the primary care needs of the area or population it serves if at least two of the following conditions exist at the facility:

(i) There are more than 8.000 outpatient visits per year per FTE primary care physician on the staff of the facility. (Here the number of FTE primary care physicians is computed as in Part I, Section B, paragraph 3 above.)

(ii) There is excessive usage of emergency room facilities for routine primary care.

(iii) Waiting time for appointments is more than 7 days for established patients or more than 14 days for new patients, for routine health services.

(iv) Waiting time at the facility is longer than 1 hour where patients have appointments or 2 hours where patients are treated on a first-come, first-served basis.

3. *Determination of Degree of Shortage.*

Each designated medical facility will be assigned to the same degree-of-shortage group as the designated area or population group which it serves.

Appendix B—Criteria for Designation of Areas Having Shortages of Dental Manpower

Part I—Geographic Areas

A. *Criteria.*

A geographic area will be designated as having a dental manpower shortage if the following three criteria are met:

1. The area is a rational area for the delivery of dental services.

2. One of the following conditions prevails in the area:

(a) The area has a population to full-time-equivalent dentist ratio of at least 5.000:1, or

(b) The area has a population to full-time-equivalent dentist ratio of less than 5.000:1 but greater than 4.000:1 and has unusually high needs for dental services or insufficient capacity of existing dental providers.

3. Dental manpower in contiguous areas are overutilized, excessively distant, or inaccessible to the population of the area under consideration.

B. *Methodology.*

In determining whether an area meets the criteria established by paragraph A of this Part, the following methodology will be used:

1. *Rational Area for the Delivery of Dental Services.*

(a) The following areas will be considered rational areas for the delivery of dental health services:

(i) A county, or a group of several contiguous counties whose population centers are within 40 minutes travel time of each other.

(ii) A portion of a county (or an area made up of portions of more than one county) whose population, because of topography, market or transportation patterns, distinctive population characteristics, or other factors, has limited access to contiguous area resources, as measured generally by a travel time of greater than 40 minutes to such resources.

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(iii) Established neighborhoods and communities within metropolitan areas which display a strong self-identity (as indicated by a homogenous socioeconomic or demographic structure and/or a traditional of interaction or intradependency), have limited interaction with contiguous areas, and which, in general, have a minimum population of 20,000.

(b) The following distances will be used as guidelines in determining distances corresponding to 40 minutes travel time:

(i) Under normal conditions with primary roads available: 25 miles.

(ii) In mountainous terrain or in areas with only secondary roads available: 20 miles.

(iii) In flat terrain or in areas connected by interstate highways: 30 miles.

Within inner portions of metropolitan areas, information on the public transportation system will be used to determine the distance corresponding to 40 minutes travel time.

2. *Population Count.*

The population count use will be the total permanent resident civilian population of the area, excluding inmates of institutions, with the following adjustments:

(a) Seasonal residents, i.e., those who maintain a residence in the area but inhabit it for only 2 to 8 months per year, may be included but must be weighted in proportion to the fraction of the year they are present in the area.

(b) Migratory workers and their families may be included in an area's population using the following formula: Effective migrant contribution to population = (fraction of year migrants are present in area) × (average daily number of migrants during portion of year that migrants are present).

3. *Counting of Dental Practitioners.*

(a) All non-Federal dentists providing patient care will be counted, except in those areas where it is shown that specialists (those dentists not in general practice or pedodontics) are serving a larger area and are not addressing the general dental care needs of the area under consideration.

(b) Full-time equivalent (FTE) figures will be used to reflect productivity differences among dental practices based on the age of the dentists, the number of auxiliaries employed, and the number of hours worked per week. In general, the number of FTE dentists will be computed using weights obtained from the matrix in Table 1, which is based on the productivity of dentists at various ages, with different numbers of auxiliaries, as compared with the average productivity of all dentists. For the purposes of these determinations, an auxiliary is defined as any non-dentist staff employed by the dentist to assist in operation of the practice.

Table 1. Equivalency Weights, by Age and Number of Auxiliaries

	<55	55–59	60–64	65+
No auxiliaries	0.8	0.7	0.6	0.5
One auxiliary	1.0	0.9	0.8	0.7
Two auxiliaries	1.2	1.0	1.0	0.8
Three auxiliaries	1.4	1.2	1.0	1.0
Four or more auxiliaries	1.5	1.5	1.3	1.2

If information on the number of auxiliaries employed by the dentist is not available, Table 2 will be used to compute the number of full-time equivalent dentists.

Table 2. Equivalency Weights, by Age

	55	55–59	60–64	65+
Equivalency weights	1.2	0.9	0.8	0.6

The number of FTE dentists within a particular age group (or age/auxiliary group) will be obtained by multiplying the number of dentists within that group by its corresponding equivalency weight. The total supply of FTE dentists within an area is then computed as the sum of those dentists within each age (or age/auxiliary) group.

(c) The equivalency weights specified in tables 1 and 2 assume that dentists within a particular group are working full-time (40 hours per week). Where appropriate data are available, adjusted equivalency figures for dentists who are semi-retired, who operate a reduced practice due to infirmity or other limiting conditions, or who are available to the population of an area only on a part-time basis will be used to reflect the reduced availability of these dentists. In computing these equivalency figures, every 4 hours (or ½ day) spent in the dental practice will be counted as 0.1 FTE except that each dentist working more than 40 hours a week will be counted as 1.0. The count obtained for a particular age group of dentists will then be multiplied by the appropriate equivalency weight from table 1 or 2 to obtain a full-time equivalent figure for dentists within that particular age or age/auxiliary category.

4. *Determination of Unusually High Needs for Dental Services.*

An area will be considered as having unusually high needs for dental services if at least one of the following criteria is met:

(a) More than 20% of the population (or of all households) has incomes below the poverty level.

(b) The majority of the area's population does not have a fluoridated water supply.

5. *Determination of Insufficient Capacity of Existing Dental Care Providers.*

An area's existing dental care providers will be considered to have insufficient capacity if at least two of the following criteria are met:

(a) More than 5,000 visits per year per FTE dentist serving the area.

(b) Unusually long waits for appointments for routine dental services (i.e., more than 6 weeks).

(c) A substantial proportion (⅔ or more) of the area's dentists do not accept new patients.

6. *Contiguous Area Considerations.*

Dental manpower in areas contiguous to an area being considered for designation will be considered excessively distant, overutilized or inaccessible to the population of the area under consideration if one of the following conditions prevails in each contiguous area:

(a) Dental manpower in the contiguous area are more than 40 minutes travel time from the center of the area being considered for designation (measured in accordance with Paragraph B.1.(b) of this Part).

(b) Contiguous area population-to-(FTE) dentist ratios are in excess of 3,000 : 1, indicating that resources in contiguous areas cannot be expected to help alleviate the shortage situation in the area being considered for designation.

(c) Dental manpower in the contiguous area are inaccessible to the population of the area under consideration because of specified access barriers, such as:

(i) Significant differences between the demographic (or socioeconomic) characteristics of the area under consideration and those of the contiguous area, indicating that the population of the area under consideration may be effectively isolated from nearby resources. Such isolation could be indicated, for example, by an unusually high proportion of non-English-speaking persons.

(ii) A lack of economic access to contiguous area resources, particularly where a very high proportion of the population of the area under consideration is poor (i.e., where more than 20 percent of the population or of the households have incomes below the poverty level) and Medicaid-covered or public dental services are not available in the contiguous area.

C. *Determination of Degree of Shortage.*

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The degree of shortage of a given geographic area, designated as having a shortage of dental manpower, will be determined using the following procedure:

Designated areas will be assigned to degree-of-shortage groups, based on the ratio (R) of population to number of full-time-equivalent dentists and the presence or absence of unusually high needs for dental services, or insufficient capacity of existing dental care providers according to the following table:

	High needs or insufficient capacity not indicated	High needs or insufficient capacity indicated
Group 1	No dentists	No dentists or R≥8,000.
Group 2	R≥8,000	8,000>R≥6,000.
Group 3	8,000>R≥6,000	6,000>R≥5,000.
Group 4	6,000>R≥5,000	5,000>R≥4,000.

Part II—Population Groups

A. *Criteria.*

1. In general, specified population groups within particular geographic areas will be designated as having a shortage of dental care manpower if the following three criteria are met:

a. The area in which they reside is rational for the delivery of dental care services, as defined in paragraph B.1 of Part I of this appendix.

b. Access barriers prevent the population group from use of the area's dental providers.

c. The ratio (R) of the number of persons in the population group to the number of dentists practicing in the area and serving the population group is at least 4,000:1.

2. Indians and Alaska Natives will be considered for designation as having shortages of dental manpower as follows:

(a) Groups of members of Indian tribes (as defined in section 4(d) of Pub. L. 94–437, the Indian Health Care Improvement Act of 1976) are automatically designated.

(b) Other groups of Indians or Alaska Natives (as defined in section 4(c) of Pub. L. 94–437) will be designated if the general criteria in paragraph 1 are met.

B. *Determination of Degree of Shortage.*

Each designated population group will be assigned to a degree-of-shortage group as follows:

Group 1—No dentists or R≥8,000.
Group 2—8,000>R≥6,000.
Group 3—6,000>R≥5,000.
Group 4—5,000>R≥4,000.

Population groups which have received "automatic" designation will be assigned to degree-of-shortage group 4 unless information on the ratio of the number of persons in the group to the number of FTE dentists serving them is provided.

Part III—Facilities

A. *Federal and State Correctional Institutions.*

1. *Criteria.*

Medium to maximum security Federal and State correctional institutions and youth detention facilities will be designated as having a shortage of dental manpower if both the following criteria are met:

(a) The institution has at least 250 inmates.

(b) The ratio of the number of internees per year to the number of FTE dentists serving the institution is at least 1,500:1. (Here the number of internees is the number of inmates present at the beginning of the year plus the number of new inmates entering the institution during the year, including those who left before the end of the year; the number of FTE dentists is computed as in Part I, Section B, paragraph 3 above.)

2. *Determination of Degree-of-Shortage.*

Designated correctional institutions will be assigned to degree-of-shortage groups as follows, based on number of inmates and/or the ratio (R) of internees to dentists:

Group 1—Institutions with 500 or more inmates and no dentists.
Group 2—Other institutions with no dentists and institutions with R > 3,000.
Group 3—Institutions with 3,000 > R > 1,500.

B. *Public or Non-Profit Private Dental Facilities.*

1. *Criteria.*

Public or nonprofit private facilties providing general dental care services will be designated as having a shortage of dental manpower if both of the following criteria are met:

(a) The facility is providing general dental care services to an area or population group designated as having a dental manpower shortage; and

(b) The facility has insuffcient capacity to meet the dental care needs of that area or population group.

2. *Methodology.*

In determining whether public or nonprofit private facilities meet the criteria established by paragraph B.1. of this part, the following methodology will be used:

(a) *Provision of Services to a Designated Area or Population Group.*

A facility will be considered to be providing services to an area or population group if either:

(i) A majority of the facility's dental care services are being provided to residents of designated dental manpower shortage areas or to population groups designated as having a shortage of dental manpower; or

(ii) The population within a designated dental shortage area or population group has reasonable access to dental services provided at the facility. Reasonable access will be assumed if the population lies within 40 minutes travel time of the facility and non-physical barriers (relating to demographic and socioeconomic characteristics of the population) do not prevent the population from receiving care at the facility.

Migrant health centers (as defined in section 319(a)(1) of the Act) which are located in areas with designated migrant population groups and Indian Health Service facilities are assumed to be meeting this requirement.

(b) *Insufficient Capacity to Meet Dental Care Needs.*

A facility will be considered to have insufficient capacity to meet the dental care needs of a designated area or population group if either of the following conditions exists at the facility.

(i) There are more than 5,000 outpatient visits per year per FTE dentist on the staff of the facility. (Here the number of FTE dentists is computed as in Part I, Section B, paragraph 3 above.)

(ii) Waiting time for appointments is more than 8 weeks for routine dental services.

3. *Determination of Degree of Shortage.*

Each designated dental facility will be assigned to the same degree-of-shortage group as the designated area or population group which it serves.

Appendix C—Criteria for Designation of Areas having Shortages of Psychiatric Manpower

Part I—Geographic Areas

A. *Criteria.*

A geographic area will be designated as having a shortage of psychiatric manpower if the following three criteria are met:

1. The area is a rational area for the delivery of psychiatric services.

2. One of the following conditions prevails within the area:

(a) The area has a population to full-time-equivalent psychiatrist ratio of at least 30,000:1; or

(b) The area has a population to full-time-equivalent psychiatrist ratio of less than 30,000:1 but greater than 20,000:1

and has unusually high needs for psychiatric services.

3. Psychiatric manpower in contiguous areas are overutilized, excessively distant or inaccessible to residents of the area under consideration.

B. *Methodology.*

In determining whether an area meets the criteria established by paragraph A of this Part, the following methodology will be used:

1. *Rational Areas for the Delivery of Psychiatric Services.*

(a) The following areas will be considered rational areas for the delivery of psychiatric services:

(i) An established mental health catchment area, as designated in the State Mental Health Plan under the general criteria set forth in section 238 of the Community Mental Health Centers Act.

(ii) A portion of an established mental health catchment area whose population, because of topography, market and/or transportation patterns or other factors, has limited access to psychiatric resources in the rest of the catchment area, as measured generally by a travel time of greater than 40 minutes to these resources.

(iii) A county or metropolitan area which contains more than one mental health catchment area, where data are unavailable by individual catchment area.

(b) The following distances will be used as guidelines in determining distances corresponding to 40 minutes travel time:

(i) Under normal conditions with primary roads available: 25 miles.

(ii) In mountainous terrain or in areas with only secondary roads available: 20 miles.

(iii) In flat terrain or in areas connected by interstate highways: 30 miles.

Within inner portions of metropolitan areas, information on the public transportation system will be used to determine the distance corresponding to 40 minutes travel time.

2. *Population Count.*

The population count used will be the total permanent resident civilian population of the area, excluding inmates of institutions.

3. *Counting of Psychiatrists.*

(a) All non-Federal psychiatrists providing patient care (direct or other, including consultation and supervision) in ambulatory or other short-term care settings to residents of the area more than one-half day per week will be counted. Those psychiatrists engaged solely in administration, research, and teaching will be excluded. Adjustments for the following factors will be made in computing the number of full-time-equivalent (FTE) psychiatrists:

(i) Psychiatric residents will be counted as 0.5 FTE psychiatrists.

(ii) Graduates of foreign medical schools who are not citizens or lawful permanent residents of the United States will be excluded from psychiatrist counts.

(iii) Those graduates of foreign medical schools who are citizens or lawful permanent residents of the United States, but do not have unrestricted licenses to practice medicine, will be counted as 0.5 FTE psychiatrists.

(b) Psychiatrists who are semi-retired, who operate a reduced practice due to infirmity or other limiting conditions, or who provide patient care to the population of an area only on a part-time basis will be discounted through the use of "full-time equivalency" figures. A 40-hour work week will be used as the standard for determining full-time equivalents in these cases. For practitioners working less than a 40-hour week, every 4 hours (or ½ day) spent providing patient care services in ambulatory or inpatient settings will be counted as 0.1 FTE, and each psychiatrist providing patient care 40 or more hours a week will be counted as 1.0 FTE. For cases where data are available only for hours providing care in office settings, equivalencies will be provided in guidelines.

(c) In some cases, psychiatrists located within an area may not be accessible to the general population of the area under consideration. Allowances for psychiatrists working in restricted facilities will be made on a case-by-case basis. Examples of restricted practices include staff positions in correctional institutions, youth detention facilities, residential treatment centers for emotionally disturbed or mentally retarded children, and inpatient units of State or county mental hospitals.

(d) In cases where there are mental health facilities or institutions providing both inpatient and outpatient services, those psychiatrists assigned to outpatient or other short-term care units will be counted. If the psychiatric staff is not specifically allocated to one service or the other, the number of psychiatrists in short-term care will be estimated on the basis of the relative workload in each type of setting.

(e) Psychiatrists who are suspended for a period of eighteen months or more under provisions of the Medicare-Medicaid Anti-Fraud and Abuse Act will not be counted.

4. *Determination of Unusually High Need for Psychiatric Services.*

An area will be considered to have unusually high needs for psychiatric services if two or more of the following criteria are met:

(a) 20 percent of the population (or of all households) have incomes below the poverty level, or the area has been designated as a poverty area in accordance with section 242 of the Community Mental Health Centers Act.

(b) A young dependency ratio (ratio of children under 18 to population 18–64) in excess of 60 percent.

(c) An aged dependency ratio (ratio of persons aged 65 and over to population 18–64) in excess of 25 percent.

(d) A high prevalence of alcoholism in the population, as indicated by a value of 0.211 for the catchment area's index of relative alcoholism prevalence (as developed by the National Institute of Alcohol Abuse and Alcoholism for the purposes of allocating funds over 42 U.S.C. 4571).

5. *Contiguous Area Considerations.*

Psychiatric manpower in areas contiguous to an area being considered for designation will be considered excessively distant, overutilized or inaccessible to the population of the area under consideration if one of the following conditions prevails in each contiguous area:

(a) Psychiatrists in the contiguous area are more than 40 minutes travel time from the center of the area being considered for designation (measured in accordance with paragraph B.1(b) of this part).

(b) Contiguous area population-to-FTE psychiatrist ratios are in excess of 20,000:1, indicating that psychiatrists in contiguous areas cannot be expected to help alleviate the shortage situation in the area for which designation is being considered.

(c) Psychiatric manpower in contiguous areas are inaccessible to the population of the requested area because of geographic, cultural, language or other barriers or because of residency restrictions of programs or facilities providing such manpower.

C. *Determination of Degree of Shortage*

Designated areas will be assigned to degree-of-shortage groups, based on the ratio (R) of population to number of FTE psychiatrists and the presence or absence of unusually high needs for psychiatric services, according to the following table:

	High needs not indicated	High needs indicated
Group 1	No psychiatrists	No psychiatrists.
Group 2	$R>50{,}000$	$R>40{,}000$
Group 3	$50{,}000>R>40{,}000$	$40{,}000>R>30{,}000$
Group 4	$40{,}000>R>30{,}000$	$30{,}000>R>20{,}000$

Part II—Population Groups

Population groups within particular catchment areas will be designated as having a psychiatric manpower shortage if the following conditions prevail:

(a) Access barriers prevent the population group from using those psychiatric manpower which are present in the area, and

(b) The ratio of the number of persons in the population group to the number of FTE psychiatrists serving the population group, and practicing within 40 minutes travel time of the center of the area where the population group resides, is at least 30.000 : 1 (20.000 : 1 where unusaily high needs for psychiatric services are indicated).

B. *Determination of Degree of Shortage.*

Designated population groups will be assigned to degree-of-shortage groups as in Section C of Part I of this Appendix, based on the ratio of the group's population to the number of psychiatrists serving it, together with the presence or absence of unusually high needs for psychiatric services among the population group.

Part III—Facilities

A. *Federal and State Correctional Institutions*

1. *Criteria.*

Medium to maximum security Federal and State correctional institutions for adults or youth, and youth detention facilities, will be designated as having a shortage of psychiatric manpower if both of the following criteria are met:

(a) The institution has more than 250 inmates, and

(b) The ratio of the number of internees per year to the number of FTE psychiatrists serving the institution is at least 2.000:1. (Here the number of internees is the number of inmates or residents present at the beginning of the year, plus the number of new inmates or residents entering the institution during the year, including those who left before the end of the year; the number of FTE psychiatrists is computed as in Part I, Section B, paragraph 3 above.)

2. *Determination of Degree of Shortage.*

Correctional facilities and youth detention facilities will be assigned to degree-of-shortage groups, based on the number of inmates and/or the ratio (R) of internees to FTE psychiatrists, as follows:

Group 1—Facilities with 500 or more inmates or residents and no psychiatrist.
Group 2—Other facilities with no psychiatrists and facilities with 500 or more inmates or residents and R > 3.000.
Group 3—All other facilities.

B. *State and County Mental Hospitals.*

1. *Criteria.*

A State or county hospital will be designated as having a shortage of psychiatric manpower if both of the following criteria are met:

(a) The mental hospital has an average daily inpatient census of at least 100; and

(b) The number of workload units per FTE psychiatrists available at the hospital exceeds 300, where workload units are calculated using the following formula:

Total workload units = average daily inpatient census + 2 × (number of inpatient admissions per year) + 0.5 × (number of admissions to day care and outpatient services per year).

2. *Determination of Degree of Shortage.*

State or county mental hospitals will be assigned to degree-of-shortage groups, based on the ratio (R) of workload units to number of FTE psychiatrists, as follows:

Group 1—No psychiatrists, or R > 1.300.
Group 2—1.800 > R > 1.200.
Group 3—1.200 > R > 600.
Group 4—600 > R > 300.

C. *Community Mental Health Centers and Other Public or Nonprofit Private Facilities.*

1. *Criteria.*

A community mental health center (CMHC), authorized by Pub. L. 94–63, or other public or nonprofit private facility providing psychiatric services to an area or population group, may be designated as having a shortage of psychiatric manpower if the facility is providing (or is responsible for providing) psychiatric services to an area or population group designated as having a psychiatric manpower shortage, and the facility has insufficient capacity to meet the psychiatric needs of the area or population group.

2. *Methodology.*

In determining whether CMHCs or other public or nonprofit private facilities meet the criteria established in paragraph C.1 of this Part, the following methodology will be used.

(a) *Provision of Services to a Designated Area or Population Group.*

The facility will be considered to be providing services to a designated area or population group if either:

(i) A majority of the facility's psychiatric services are being provided to residents of designated psychiatric manpower shortage areas or to population groups designated as having a shortage of psychiatric manpower; or

(ii) The population within a designated psychiatric shortage area or population group has reasonable access to psychiatric services provided at the facility. Such reasonable access will be assumed if the population lies within 40 minutes travel time of the facility and nonphysical barriers (relating to demographic and socioeconomic characteristics of the population) do not prevent the population from receiving care at the facility.

(b) *Responsibility for Provision of Services.*

This condition will be considered to be met if the facility, by Federal or State statute, administrative action, or contractual agreement, has been given responsibility for providing and/or coordinating psychiatric services for the area or population group, consistent with applicable State plans.

(c) *Insufficient Capacity to Meet Psychiatric Needs.*

A facility will be considered to have insufficient capacity to meet the psychiatric needs of the area or population it serves if:

(i) There are more than 3.000 patient visits per year per FTE psychiatrist on the staff are under care at the facility, or

(ii) No psychiatrists are on the staff and this facility is the only facility providing (or responsible for providing) services to the designated area or population.

3. *Determination of Degree-of-Shortage.*

Each designated facility will be assigned to the same degree-of-shortage group as the designated area or population group which it serves.

Appendix D—Criteria for Designation of Areas Having Shortages of Vision Care Manpower

Part I—Geographic Areas

A. *Criteria.*

A geographic area will be designated as having a shortage of vision care manpower if the following three criteria are met:

1. The area is a rational area for the delivery of vision care services.
2. The estimated number of optometric visits supplied by vision care manpower in the area is less than the estimated requirements of the area's population for these visits, and the computed shortage is at least 1.500 optometric visits.
3. Vision care manpower in contiguous areas are excessively distant, overutilized, or inaccessible to the population of the area under consideration.

B. *Methodology.*

In determining whether an area meets the criteria established by paragraph A of this part, the following methodology will be used:

1. *Rational Areas for the Delivery of Vision Care Services.*

(a) The following areas will be considered rational areas for the delivery of vision care services:

(i) A county, or a group of contiguous counties whose population centers are within 40 minutes travel time of each other;

(ii) A portion of a county (or an area made up of portions of more than one county) whose population, because of topography, market or transportation patterns, or other factors, has limited access to contiguous area resources, as measured generally by a travel time of greater than 40 minutes to these resources.

(b) The following distances will be used as guidelines in determining distances corresponding to 40 minutes travel time:

(i) Under normal conditions with primary roads available: 25 miles.

(ii) In mountainous terrain or in areas with only secondary roads available: 20 miles.

(iii) In flat terrain or in areas connected by interstate highways: 30 miles.

Within inner portions of metropolitan areas, information on the public transportation system will be used to determine the distance corresponding to 40 minutes travel time.

2. *Determination of Estimated Requirement for Optometric Visits.*

The number of optometric visits required by an area's population will be estimated by multiplying each of the following visit rates by the size of the population within that particular age group and then adding the figures obtained together.

Age	Annual number of optometric visits required per person, by age					
	Under 20	20-29	30-39	40-49	50-59	60 and over
Number of visits	0.11	0.20	0.24	0.35	0.41	0.48

For geographic areas where the age distribution of the population is not known, it will be assumed that the percentage distribution, by age groups, for the area is the same as the distribution for the county of which it is a part.

(3) *Determination of Estimated Supply of Optometric Visits.*

The estimated supply of optometric services will be determined by use of the following formula:

Optometric visits supplied = 3,000 × (number of optometrists under 65)
Optometric visits supplied + 2,000 × (number of optometrists 65 and over)
Optometric visits supplied + 1,500 × (number of ophthalmologists)

(4) *Determination of Size of Shortage.*

Size of shortage (in number of optometric visits) will be computed as follows:

Optometric visit shortage = visits required − visits supplied

(5) *Contiguous Area Considerations.*

Vision care manpower in area contiguous to an area being considered for designation will be considered execessively distant, overutilized or inaccessible to the population of the area if one of the following conditions prevails in each contiguous area:

(a) Vision care manpower in the contiguous area are more than 40 minutes travel time from the center of the area being considered for designation (measured in accordance with paragraph B.1(b) of this Part).

(b) The estimated requirement for vision care services in the contiguous area exceeds the estimated supply of such services there, based on the requirements and supply calculations previously described.

(c) Vision care manpower in the contiguous area are inaccessible to the population of the area because of specified access barriers (such as economic or cultural barriers).

C. *Determination of Degree-of-Shortage.*

Designated areas (and population groups) will be assigned to degree-of-shortage groups, based on the ratio of optometric visits supplied to optometric visits required for the area (or group), as follows:

Group 1—Areas (or groups) with no optometric visits being supplied (i.e., with no optometrists or ophthalmologists).

Group 2—Areas (or groups) where the ratio of optometric visits supplied to optometric visits required is less than 0.5.

Group 3—Areas (or groups) where the ratio of optometric visits supplied to optometric visits required is between 0.5 and 1.0.

Part II—Population Groups

A. *Criteria.*

Population groups within particular geographic areas will be designated if both the following criteria are met:

(1) Members of the population group do not have access to vision care resources within the area (or in contiguous areas) because of non-physical access barriers (such as economic or cultural barriers).

(2) The estimated number of optometric visits supplied to the population group (as determined under paragraph B.3 of Part I of this Appendix) is less than the estimated number of visits required by that group (as determined under paragraph B.2 of Part I of this Appendix), and the computed shortage is at least 1,500 optometric visits.

B. *Determination of Degree of Shortage.*

The degree of shortage of a given population group will be determined in the same way as described for areas in paragraph C of Part I of this Appendix.

Appendix E—Criteria for Designation of Areas Having Shortages of Podiatric Manpower

Part I—Geographic Areas

A. *Criteria.*

A geographic area will be designated as having a shortage of podiatric manpower if the following three criteria are met:

1. The area is a rational area for the delivery of podiatric services.

2. The area's ratio of population to foot care practitioners is at least 28,000:1, and the computed podiatrist shortage to meet this ratio is at least 0.5.

3. Podiatric manpower in contiguous areas are overutilized, excessively distant, or inaccessible to the population of the area under consideration.

B. *Methodology.*

In determining whether an area meets the criteria established by paragraph A of this Part, the following methodology will be used:

1. *Rational Areas for the Delivery of Podiatric Services.*

(a) The following areas will be considered rational areas for the delivery of podiatric services:

(i) A county or a group of contiguous counties whose population centers are within 40 minutes travel time of each other.

(ii) A portion of a county, or an area made up of portions of more than one county, whose population, because of topography, market and/or transportation patterns or other factors, has limited access to contiguous area resources, as measured generally by a travel time of greater than 40 minutes from its population center to these resources.

(b) The following distances will be used as guidelines in determining distances corresponding to 40 minutes travel time:

(i) Under normal conditions with primary roads available: 25 miles.

(ii) In mountainous terrain or in areas with only secondary roads available: 20 miles.

(iii) In flat terrain or in areas connected by interstate highways: 30 miles.

Within inner portions of metropolitan areas, information on the public transportation system will be used to determine the area corresponding to 40 minutes travel time.

2. *Population Count.*

The population count used will be the total permanent resident civilian population of the area, excluding inmates of institutions, adjusted by the following formula to take into account the differing utilization rates of podiatric services by different age groups within the population:

Adjusted population = total population × (1 + 2.2 × (percent of population 65 and over) − 0.44 × (percent of population under 17)).

3. *Counting of Foot Care Practitioners.*

(a) All podiatrists providing patient care will be counted. However, in order to take into account productivity differences in podiatric practices associated with the age of the podiatrists, the following formula will be utilized:

Number of FTE podiatrists = 1.0 × (podiatrists under age 55) + .8 × (podiatrists age 55 and over)

(b) In order to take into account the fact that orthopedic surgeons and general and family practitioners devote a percentage of their time to foot care, the total available foot care practitioners will be computed as follows:

Number of foot care practitioners = number of FTE podiatrists
+ .15 × (number of orthopedic surgeons)
+ .02 × (number of general and family practioners).

4. *Determination of Size of Shortage.*

Size of shortage (in number of FTE podiatrists) will be computed as follows:

Podiatrist shortage = adjusted population/28.000 − number of FTE foot care practitioners.

5. *Contiguous Area Considerations.*

Podiatric manpower in areas contiguous to an area being considered for designation will be considered execessively distant, overutilized or inaccessible to the population of the area under consideration if one of the following conditions prevails in each contiguous area:

(a) Podiatric manpower in the contiguous area are more than 40 minutes travel time from the center of the area being considered for designation.

(b) The population-to-foot care practitioner ratio in the contiguous areas is in excess of 20.000 : 1, indicating that contiguous area podiatric manpower cannot be expected to help alleviate the shortage situation in the area for which designation is requested.

(c) Podiatric manpower in the contiguous area are inaccessible to the population of the area under consideration because of specified access barriers (such as economic or cultural barriers).

C. *Determination of Degree of Shortage.*

Designated areas will be assigned to groups, based on the ratio (R) of adjusted population to number of foot care practitioners, as follows:

Group 1 Areas with no foot care practitioners, and areas with R > 50.000 and no podiatrists.
Group 2 Other areas with R > 50.000.
Group 3 Areas with 50.000 > R > 28.000.

Appendix F—Criteria for Designation of Areas Having Shortages of Pharmacy Manpower

Part 1—Geographic Areas

A. *Criteria.*

A geographic area will be designated as having a shortage of pharmacy manpower if the following three criteria are met:

1. The area is a rational area for the delivery of pharmacy services.

2. The number of pharmacists serving the area is less than the estimated requirement for pharmacists in the area, and the computed pharmacist shortage is at least 0.5.

3. Pharmacists in contiguous areas are overutilized or excessively distant from the population of the area under consideration.

B. *Methodology.*

In determining whether an area meets the criteria established by paragraph A of this Part, the following methodology will be used:

1. *Rational Areas for the Delivery of Pharmacy Services.*

(a) The following areas will be considered rational areas for the delivery of pharmacy services:

(i) A county, or a group of contiguous counties whose population centers are within 30 minutes travel time of each other; and

(ii) A portion of a county, or an area made up of portions of more than one county, whose population, because of topography, market or transportation patterns or other factors, has limited access to contiguous area resources, as measured generally by a travel time of greater than 30 minutes to these resources.

(b) The following distances will be used as guidelines in determining distances corresponding to 30 minutes travel time:

(i) Under normal conditions with primary roads available: 20 miles.

(ii) In mountainous terrain or in areas with only secondary roads available: 15 miles.

(iii) in flat terrain or in areas connected by interstate highways: 25 miles.

Within inner portions of metropolitan areas, information on the public transportation system will be used to determine the area corresponding to 30 minutes travel time.

2. *Counting of Pharmacists.*

All active pharmacists within the area will be counted, except those engaged in teaching, administration, or pharmaceutical research.

3. *Determination of Estimated Requirement for Pharmacists.*

(a) *Basic estimate.* The basic estimated requirement for pharmacists will be calculated as follows:

Basic pharmacist requirement = .15 × (resident civilian population/1.000) + .035 × (total number of physicians engaged in patient care in the area).

(b) *Adjusted estimate.* For areas with less than 20.000 persons, the following adjustment is made to the basic estimate to compensate for the lower expected productivity of small practices.

Estimated pharmacist requirement = (2 − population/20.000) × basic pharmacist requirement.

4. *Size of Shortage Computation.*

The size of the shortage will be computed as follows:

Pharmacist shortage = estimated pharmacist requirement − number of pharmacists available.

5. *Contiguous Area Considerations.*

Pharmacists in areas contiguous to an area being considered for designation will be considered excessively distant or overutilized if either:

(a) Pharmacy manpower in contiguous areas are more than 30 minutes travel time from the center of the area under consideration, or

(b) The number of pharmacists in each contiguous area is less than or equal to the estimated requirement for pharmacists for that contiguous area (as computed above).

C. *Determination of Degree-of-Shortage.*

Designated areas will be assigned to degree-of-shortage groups, based on the proportion of the estimated requirement for pharmacists which is currently available in the area, as follows:

Group 1—*Areas with no pharmacists.*

Group 2—Areas where the ratio of available pharmacists to pharmacists required is less than 0.5.

Group 3—Areas where the ratio of available pharmacists to pharmacists required is between 0.5 and 1.0.

Appendix G—Criteria for the Designation of Areas Having Shortages of Veterinary Manpower

Part I—Geographic Areas

A. *Criteria for Food Animal Veterinary Shortage.*

A geographic area will be designated as having a shortage of food animal veterinary manpower if the following three criteria are met:

1. The area is a rational area for the delivery of veterinary services.

2. The ratio of veterinary livestock units to food animal veterinarians in the area is at least 10,000 : 1, and the computed food animal veterinarian shortage to meet this ratio is at least 0.5.

3. Food animal veterinarians in contiguous areas are overutilized or excessively distant from the population of the area under consideration.

B. *Criteria for Companion Animal Veterinary Shortage.*

A geographic area will be designated as having a shortage of companion animal veterinary manpower if the following three criteria are met:

1. The area is a rational area for the delivery of veterinary services.

2. The ratio of resident civilian population to number of companion animal veterinarians in the area is at least 30,000 : 1 and the computed companion animal veterinary shortage to meet this ratio is at least 0.5.

3. Companion animal veterinarians in contiguous areas are overutilized or excessively distant from the population of the area under consideration.

C. *Methodology.*

In determining whether an area meets the criteria established by paragraphs A and B of this Part, the following methodology will be used:

1. *Rational Areas for the Delivery of Veterinary Services.*

(a) The following areas will be considered rational areas for the delivery of veterinary services:

(i) A county, or a group of contiguous counties whose population centers are within 40 minutes travel time of each other.

(ii) A portion of a county (or an area made up of portions of more than one county) which, because of topography, market and/or transportation patterns or other factors, has limited access to contiguous area resources, as measured generally by a travel time of greater than 40 minutes to these resources.

(b) The following distances will be used as guidelines in determining distances corresponding to 40 minutes travel time:

(i) Under normal conditions with primary roads available: 25 miles.

(ii) In mountainous terrain or in areas with only secondary roads available: 20 miles.

(iii) In flat terrain or in areas connected by interstate highways: 30 miles.

2. *Determination of Number of Veterinary Livestock Units (VLU) Requiring Care.*

Since various types of food animals require varying amounts of veterinary care, each type of animal has been assigned a weight indicating the amount of veterinary care it requires relative to that required by a milk cow. Those weights are used to compute the number of "Veterinary Livestock Units" (VLU) for which veterinary care is required.

The VLU is computed as follows:

Veterinary Livestock Units (VLU) = (number of milk cows)
+ .2 × (number of other cattle and calves)
+ .05 × (number of hogs and pigs)
+ .05 × (number of sheep)
+ .002 × (number of poultry).

3. *Counting of Food Animal Veterinarians.*

The number of food animal veterinarians is determined by weighting the number of veterinarians within each of several practice categories according to the average fraction of practice time in that category which is devoted to food animal veterinary care, as follows:

Number of Food Animal Veterinarians = (number of veterinarians in large animal practice, exclusively)
+ (number of veterinarians in bovine practice, exclusively)
+ (number of veterinarians in poultry practice, exclusively)
+ .75 × (mixed practice veterinarians with greater than 50% of practice in large animal care)
+ .5 × (mixed practice veterinarians with approximately 50% of practice in large animal care)
+ .25 × (mixed practice veterinarians with less than 50% of practice in large animal care).

4. *Counting of Companion Animal Veterinarians* (that is, those who provide services for dogs, cats, horses, and any other animals maintained as companions to the owner rather than as food animals).

The number of full-time equivalent companion animal veterinarians is determined by weighting the number of veterinarians within each of several practice categories by the average portion of their practice which is devoted to companion animal care by the practitioners within that category, as follows:

Number of Companion Animal Veterinarians = (number of veterinarians in large animal practice, exclusively)
+ (number of veterinarians in equine practice, exclusively)
+ .75 × (mixed practice veterinarians with greater than 50% of practice in small animal care)
+ .5 × (mixed practice veterinarians with approximately 50% of practice in small animal care)
+ .25 × (mixed practice veterinarians with less than 50% of practice in small animal care).

5. *Size of Shortage Computation.*

The size of shortage will be computed as follows:

(a) Food animal veterinarian shortage = (VLU/10,000) − (number of food animal veterinarians).

(b) Companion animal veterinarian shortage = (resident civilian pop./30,000) − (number of companion animal veterinarians).

6. *Contiguous Area Considerations.*

Veterinary manpower in areas contiguous to an area being considered for designation will be considered excessively distant from the population of the area or overutilized if one of the following conditions prevails in each contiguous area:

(a) Veterinary manpower in the contiguous area are more than 60 minutes travel time from the center of the area being considered for designation (measured in accordance with paragraph C.1.(b) of this Part).

(b) In the case of food animal veterinary manpower, the VLU-to-food animal veterinarian ratio in the contiguous area is in excess of 5,000 : 1.

(c) In the case of companion animal veterinary manpower, the population-to-companion animal veterinarian ratio in the contiguous area is in excess of 15,000 : 1.

C. *Determination of Degree-of-Shortage.*

Designated areas will be assigned to degree-of-shortage groups as follows:

Group 1—Areas with a food animal veterinarian shortage and no veterinarians.

Group 2—Areas (not included above) with a food animal veterinarian shortage and no food animal veterinarians.

Group 3—All other food animal veterinarian shortage areas.

Group 4—All companion animal shortage areas (not included above) having no veterinarians.

Group 5—All other companion animal shortage areas.

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Appendix B. Statistical Measures Used in Case Studies

Appendix B

DEFINITIONS OF ALTERNATIVE GOALS (TYPES OF SHORTAGE)

NEED:	That quantity of medical services which expert medical opinion believes should be consumed over a relevant period by a population in order for its members to remain or become as healthy as is permitted by existing knowledge.
UNMET NEED:	The difference between the quantity of medical services which medical opinion believes is needed (as defined above) by a population and the quantity of services which is consumed.
HEALTH STATUS:	An individual's state of physical or mental well-being.
WANT:	That quantity of medical services which a population's members desire to consume over a relevant time period based upon their values, preferences, and perceptions of their health needs providing that they encounter no barriers to care
UNMET WANT:	The difference between that quantity of medical services the population desires to consume (as defined above) and that quantity which is consumed.
DEMAND:	An entire functional relationship describing the quantity of medical services that would be bought by an individual or a population under various market circumstances such as different prices, incomes, or supplies of services.
UNMET DEMAND:	Parallel to the economic concept of Excess Demand--The condition that exists when consumers desire to buy more health services than providers are willing to produce under a given set of market circumstances.
UTILIZATION:	That quantity of medical services ultimately consumed within a defined period of time. It is a one particular occurrence resulting from particular supply and demand circumstances among the many that could have occurred had circumstances been different.

ACCESS:	The absence of geographic, financial, and capacity barriers that reduce a population's ability to reach (travel to), afford (pay for), and obtain in a timely manner health services that are wanted or desired.
INSUFFICIENT CAPACITY:	The inability to obtain health services in a timely fashion. It is a element in the definition of access.
AVAILABILITY:	The presence of necessary inputs for the production of health services (i.e. stocks of personnel like MD's, nurses and DDS's).
SUPPLY:	An entire functional relationship describing the quantity of health services that will be produced by providers, both as individuals and in groups, given market circumstances. It is not the same as availability which is the presence of inputs to the production of health services.

APPENDIX C. MEASURES USED TO IDENTIFY ALTERNATIVE TYPES OF SHORTAGE

Appendix C

ACTUAL MEASURES USED FOR ALTERNATIVE GOALS (TYPES OF SHORTAGE)

GOAL: Health Status/Need (Clinical)

Infant Mortality
RI - Mortality Rate
Per Capita Deaths

GOAL: Perceived Health/Perceived Need

Perceived Health
Percent Limitation

GOAL: Utilization/Demand

Total MD Visits (self reported annual)
Charge for routine office visit
% pts in MD practice - Medicaid
% pts in MD practice with private insurance
% pts in MD practice - Medicare
Pt wait time in office (min.)
Days wait for appt. (estab. pt)

GOAL: Insufficient Capacity/Excess Demand

Outpatient department visits to a hospital
Emergency room visits to a hospital
Change in % MDs accepting no new pts.
Change in days wait for appt. (estab pt.)
Change in pt. wait time in office (min.)
Change in % MDs accepting Medicaid
Change in % pts. in MD pactice that are Medicaid
Change in % pts in MD practice that are Medicare
Change in charge for routine office visit

GOAL: Supply/Availability/Productivity

POP/MD
POP/FTE
Pts seen/hr
Pts seen/wk
Change in pts seen/hr.
Change in pts seen/wk.

GOAL: Access

Travel time (min)

Percent MDs accepting Medicaid
Percent pts. in MD's pract. receiving discounts
Percent MDs accepting Medicare
Percent of MDs giving discounts
Per capita AFDC payments

GOAL: Socio Demographics

% below poverty
Educ 70
% Black
% Urban
PC INC
Unempl 80
Percent Old

GOAL: UNMET NEED

UDI
Use/Need
DAMI

HMSA POP/MD
POP/FTE

IMU

APPENDIX D

ANALYTICAL TABLES FOR COMPARISON OF HMSA WITH ALTERNATE MEASURES

Table D-1

Simple rank-order correlations

	POP/FTE	POP/MD	DAMI	UDI	IMU	USENEED
INDICES-INTERCORRELATIONS						
POP/FTE 1/	1.000	.750	.289	-.145	-.605	-.253
POP/MD 1/		1.000	.302	-.137	-.595	-.279
DAMI 1/			1.000	-.477	-.437	-.957
UDI 1/				1.000	.468	.475
IMU 1/					1.000	.417
USENEED 1/						1.000
SOCIODEMOGRAPHIC						
PCTBLPOV 1/	.390	.382	.459	-.607	-.774	-.430
EDUC70 1/	-.446	-.465	-.505	.588	.680	.461
PCT BLACK 1/	.062	.016*	.261	-.199	-.210	-.110
PCT URBAN 1/	-.413	-.465	-.261	.220	.456	.292
PCINC 1/	-.454	-.479	-.489	.630	.695	.489
UNEMP80 1/	.140	.132	.264	-.197	-.077	-.235
PCT OLD 1/	-.069	-.001*	.115	-.320	-.229	-.330
HEALTH STATUS/CLINICAL NEED						
Infant Mortality 1/	.071	.082	.235	-.285	-.335	-.167
RI-Mortality Rate 1/	.048	.086	.486	-.444	-.312	-.582
Per Capita Deaths 1/	-.016	-.039	.317	-.432	-.332	-.431
PERCEIVED HEALTH/PERCEIVED NEED						
Perceived health 3/		.219	.429	-.380	-.449	-.393
Percent limitation 3/		.091*	.314	-.271	-.251	-.321
INSUFF. CAPACITY/EXCESS DEMAND						
OP visits (PC) 1/	-.446	-.490	-.193	.101	.436	.210
ER visits (PC) 1/	-.370	-.435	-.100	-.034*	.313	.144
Change in % of MDs accepting no new pats. 2/		.077*	-.008*	-.069*	-.142	-.107*
Change in days wait for appt. (estab. pat.) 2/		.100*	.001*	-.079*	.064*	-.130
Change in pat. wait time in office (min.) 2/		-.189	-.135	.180	.020*	.161
Change in % MDs accepting Medicaid pats. 2/		.054*	.039*	-.015*	.056*	-.007*
Change in % Medicaid pats. in MDs prac. 2/		.117*	.122*	-.183	.043*	-.125
Change in charge for routine office visits ($) 2/		-.189	.025*	.188	.096*	.124
Change in % Medicare pats. in MDs prac. 2/		.105*	.057*	-.037*	.116*	-.081*
UTILIZATION/DEMAND						
Total MD visits (annual) 3/		-.140	-.139	.317	.126*	.154
Charge for routine office visit ($) 2/		-.456	-.175	.484	.130	.394
% Medicaid pats. in MD practice 2/		.337	.179	-.349	-.004*	-.250
% pats. with private insurance 2/		-.025*	-.025*	.024*	-.020*	.003*
% Medicare pats. in MD practice 2/		.050*	.106*	-.077*	.053*	-.072*
Patient wait time in office (min.) 2/		.174	.006*	-.159	-.069*	-.038*
Days wait for appt. (estab. pat.) 2/		.147	-.002*	-.147	.028*	-.144
ACCESS						
Travel time (min.) 2/		-.052*	-.069*	.013*	-.074*	.070*
% pats. receiving discounts 2/		-.064*	-.004*	.036*	-.014*	.044*
% MDs giving discounts 2/		-.151	-.008*	.058*	-.016*	.030*
Per capita AFDC payments 1/		-.159	.006*	-.032	.141	.001*
% MDs accepting Medicaid 2/		.360	.285	-.315	-.064*	-.359
% MDs accepting Medicare 2/		-.027*	.057*	.023*	.079*	.052*
SUPPLY/AVAIL./PRODUCTIVITY						
POP/MD 1/		1.000	.302	-.187	-.595	-.279
POP/FTE 1/		.750	.289	-.145	-.605	-.253
Pats. seen/hour 2/		.149	-.025*	-.112*	-.093*	-.006*
Pats. seen/week 2/		.193	-.037*	-.145	-.061*	-.068*
Change in pats. seen/hour 2/		.018*	-.056*	.022*	-.126	.022*
Change in pats. seen/week 2/		-.170	-.228	.213	.054*	.158

1/ N=2600
2/ N=251
3/ N=454
* Not significantly different from zero at the 5 percent confidence level (see Table 20 for means and standard deviations)

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-2

Principal components analysis
for
primary care physicians

Rotated factor pattern

Variable	FACTOR 1	FACTOR 2	FACTOR 3	FACTOR 4	FACTOR 5	FACTOR 6
Indices						
POP/MD	.17	-.14	-.28	-.02	.09	-.67
POP/FTE	-.03	-.12	.10	-.10	.04	.63
DAMI	.36	.07	-.06	.03	.87	-.13
USENEED	-.16	-.32	.05	-.03	-.86	.18
UDI	-.55	-.38	.03	-.12	-.32	.10
IMU	-.67	-.26	.19	.03	-.15	.46
Mortality						
MORT7377	.70	.00	.12	-.11	.02	.12
PCDEATHS	.17	.89	-.03	-.04	.17	.04
RI	.13	.67	.03	.14	.50	.02
Economic						
PCTBLPOV	.78	.24	-.11	.12	.11	-.35
PCINC77	-.55	-.32	.09	-.26	-.27	.48
PCAFDCP	.01	-.01	.15	.77	-.10	.24
UNEMP80	.02	-.06	.02	.82	.18	-.17
Socio-demographic						
PCTBLK80	.74	-.23	.02	-.03	.27	.15
PCTURB70	-.08	-.35	.26	-.07	-.13	.62
PCTOLD75	-.00	.93	-.09	-.13	.02	.00
EDUC70	-.66	-.16	.17	-.16	-.17	.44
Excess Demand						
PCOUTVIS	-.07	-.07	.90	.05	-.05	.04
PCEMVIS	.02	-.04	.89	.11	-.01	.18

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-3

Crosstabulation of counties by HMSA designation status and hypothetical shortage designation status based upon the POP/MD index

	FREQUENCY PERCENT COL PCT	HMSA Designation Status			
		Wholly Designated	Partly Designated 1/	Not Designated	Total
COUNTY QUARTILES	Most designatable by POP/MD	460 17.52 63.54	65 2.48 9.00	131 4.99 11.10	656 24.98
	2	174 6.63 24.03	152 5.79 21.05	331 12.60 28.05	657 25.02
	3	60 2.28 8.29	219 8.34 30.33	378 14.39 32.03	657 25.02
	Least designatable by POP/MD	30 1.14 4.14	286 10.89 39.61	340 12.95 28.81	656 24.98
	TOTAL	724 27.57	722 27.49	1180 44.94	2626 100.00

Subtotals may not add to total due to independent rounding.

Chi-Square = 911.8 DF = 6; PROB = 0.0001

Contingency Coefficient = 0.508

Spearman Correlation = -0.027

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-4

Crosstabulation of counties by HMSA designation status and hypothetical shortage designation status based upon the IMU

COUNTY QUARTILES

FREQUENCY PERCENT COL PCT	HMSA Designation Status			
	Wholly Designated	Partly 1/ Designated	Not Designated	Total
Most designatable by IMU	387 20.33 53.45	57 2.17 7.89	213 11.19 18.05	600 31.51
2	218 11.45 30.11	129 4.91 17.87	310 16.28 26.27	528 27.73
3	102 5.36 14.09	219 8.34 30.33	338 17.75 28.64	440 23.11
Least designatable by IMU	17 0.89 2.35	317 12.07 43.91	319 16.75 27.03	336 17.65
TOTAL	724 38.03	722 27.49	1180 61.97	1904 100.00

Subtotals may not add to total due to independent rounding.

Chi-Square = 668.4 DF = 6; PROB = 0.0001

Contingency Coefficient = 0.450

Spearman Correlation = 0.072

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-5

Crosstabulation of counties by HMSA designation status and hypothetical shortage designation status based upon the DAMI index

	FREQUENCY PERCENT COL PCT	HMSA Designation Status			
		Wholly Designated	Partly Designated 1/	Not Designated	Total 2/
COUNTY QUARTILES	Most designatable by DAMI	274 10.46 37.85	115 4.39 16.08	240 9.16 20.34	629 24.02
	2	136 5.19 18.78	107 4.09 14.97	222 8.48 18.81	465 17.75
	3	148 5.65 20.44	165 6.30 23.08	291 11.11 24.66	604 23.06
	Least designatable by DAMI	166 6.34 22.93	328 12.52 45.87	427 16.30 36.19	921 35.17
	TOTAL	724 27.64	715 27.30	1180 45.06	2619 100.00

Subtotals may not add to total due to independent rounding.

Chi-Square = 145.3 DF = 6; PROB = 0.0001

Contingency Coefficient = 0.229

Spearman Correlation = -0.035

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

2/ Quartiles are not evenly distributed due to tied ranks.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-6

Crosstabulation of counties by HMSA designation status and hypothetical shortage designation status based upon the USENEED index

COUNTY QUARTILES

FREQUENCY PERCENT COL PCT	HMSA Designation Status			
	Wholly Designated	Partly Designated 1/	Not Designated	Total
Most designatable by USENEED	274 10.46 37.85	119 4.54 16.64	262 10.00 22.20	655 25.01
2	185 7.06 25.55	154 5.88 21.54	316 12.07 26.78	655 25.01
3	147 5.61 20.30	189 7.22 26.43	319 12.18 27.03	655 25.01
Least designatable by USENEED	118 4.51 16.30	253 9.66 35.38	283 10.81 23.98	654 24.97
TOTAL	724 27.64	715 27.30	1180 45.06	2619 100.00

Subtotals may not add to total due to independent rounding.

Chi-Square = 138.7 DF = 6; PROB = 0.0001

Contingency
Coefficient = 0.224

Spearman
Correlation = 0.061

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-8

Crosstabulation of counties by HMSA designation status and hypothetical shortage designation status based upon the UDI

	FREQUENCY PERCENT COL PCT	HMSA Designation Status			
		Wholly Designated	Partly Designated 1/	Not Designated	Total
COUNTY QUARTILES	Most designatable by UDI	162	132	363	657
		6.17	5.03	13.82	25.02
		22.38	18.28	30.76	
	2	189	164	303	656
		7.20	6.25	11.54	24.98
		26.10	22.71	25.68	
	3	215	197	246	658
		8.19	7.50	9.37	25.06
		29.70	27.29	20.85	
	Least designatable by UDI	158	229	268	654
		6.02	8.72	10.21	24.94
		21.82	31.72	22.71	
	TOTAL	724	722	1180	2626
		27.57	27.49	44.94	100.00

Subtotals may not add to total due to independent rounding.

Chi-Square = 67.2 DF = 6; PROB = 0.0001

Contingency
Coefficient = 0.158

Spearman
Correlation = 0.135

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-7

Crosstabulation of counties by HMSA designation status and hypothetical shortage designation status based upon the Infant Mortality index

COUNTY QUARTILES

FREQUENCY PERCENT COL PCT	HMSA Designation Status			
	Wholly Designated	Partly Designated 1/	Not Designated	Total
Most designatable by Infant Mortality	351 9.89 22.82	110 3.58 14.08	304 9.89 22.82	765 24.02
2	183 5.95 19.04	201 6.54 25.74	373 12.13 28.00	757 24.63
3	181 5.89 18.83	260 8.46 33.29	346 11.26 25.98	787 25.60
Least designatable by Infant Mortality	246 8.00 25.60	210 6.83 26.89	309 10.05 23.20	765 24.89
TOTAL	961 31.26	781 25.41	1332 43.33	3074 100.00

Subtotals may not add to total due to independent rounding.

Chi-Square = 148.2 DF = 6; PROB = 0.0001

Contingency Coefficient = 0.214

Spearman Correlation = 0.059

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-9

Comparison of county characteristics based on hypothetical designation by POP/MD vs. actual health manpower shortage area designations (mean percentiles and standard deviations)

	IF DESIGNATED BY POP/MD			NOT DESIGNATED BY POP/MD		
	Wholly Designated HMSA	Partly Designated HMSA 1/	Not Designated HMSA	Wholly Designated HMSA	Partly Designated HMSA	Not Designated HMSA
Indices						
POP/MD	[illegible] (8)	82 (8)	83 (8)	51 (18)	30 (21)	36 (20)
POP/FTE	81 (13)	74 (18)	64 (25)	71 (16)	32 (22)	37 (23)
DANI	58 (29)	50 (29)	47 (30)	52 (29)	36 (27)	43 (28)
USENEED	39 (28)	46 (28)	50 (30)	43 (29)	59 (28)	51 (28)
UDI	43 (28)	51 (26)	50 (30)	43 (28)	60 (28)	47 (28)
IMU	24 (19)	36 (21)	37 (23)	33 (24)	69 (23)	56 (26)
Mortality						
MORT7377	53 (33)	44 (30)	51 (30)	54 (31)	44 (25)	50 (28)
PCDEATHS	52 (27)	44 (29)	46 (32)	56 (29)	45 (27)	51 (30)
RI	53 (29)	43 (28)	44 (30)	55 (30)	46 (28)	50 (29)
Economic						
PCTBLPOV	68 (25)	50 (28)	52 (30)	62 (27)	33 (24)	44 (28)
PCINC77	27 (23)	39 (25)	45 (30)	37 (26)	63 (25)	56 (26)
PCAFDCP	44 (27)	59 (27)	38 (27)	47 (26)	66 (27)	43 (27)
PCOUTVIS	24 (26)	37 (29)	33 (28)	42 (29)	66 (24)	54 (26)
PCEMVIS	26 (28)	37 (29)	34 (29)	43 (29)	63 (25)	55 (27)
Sociodemographic						
PCTBLK80	49 (35)	38 (32)	47 (35)	47 (34)	46 (28)	48 (30)
PCTURB70	22 (25)	29 (25)	36 (31)	35 (31)	62 (29)	54 (29)
PCTOLD75	50 (26)	42 (29)	46 (32)	55 (29)	45 (27)	52 (30)
EDUC70	26 (23)	46 (28)	40 (26)	37 (25)	62 (23)	52 (26)
UNEMP80	55 (29)	57 (26)	44 (29)	50 (30)	53 (27)	44 (29)
Number of Counties	489	76	159	234	646	1,021

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-10

Comparison of county characteristics based on hypothetical designation by IMU vs. actual health manpower shortage area designations (mean percentiles and standard deviations)

	IF DESIGNATED BY IMU			NOT DESIGNATED BY IMU		
	Wholly Designated HMSA	Partly Designated HMSA 1/	Not Designated HMSA	Wholly Designated HMSA	Partly Designated HMSA	Not Designated HMSA
Indices						
POP/MD	76 (19)	62 (22)	55 (23)	71 (23)	33 (24)	39 (24)
POP/FTE	79 (13)	64 (25)	52 (25)	75 (17)	33 (24)	37 (24)
DAMI	63 (25)	58 (29)	58 (28)	46 (28)	36 (27)	40 (27)
USENEED	34 (27)	38 (26)	37 (26)	49 (29)	59 (27)	54 (27)
UDI	33 (26)	33 (23)	29 (25)	56 (24)	61 (27)	53 (28)
IMU	12 (8)	14 (6)	15 (8)	48 (15)	70 (20)	63 (20)
Mortality						
MORT7377	60 (32)	64 (27)	62 (29)	44 (30)	42 (25)	47 (27)
PCDEATHS	59 (25)	58 (32)	67 (29)	45 (28)	43 (26)	45 (29)
RI	59 (27)	55 (27)	65 (27)	45 (30)	45 (27)	45 (28)
Economic						
PCTBLPOV	80 (17)	76 (19)	76 (17)	47 (24)	31 (22)	36 (24)
PCINC77	19 (18)	25 (19)	30 (23)	46 (24)	64 (24)	61 (24)
PCAFDCP	50 (26)	57 (27)	42 (26)	38 (26)	66 (27)	42 (27)
PCOUTVIS	26 (27)	44 (29)	39 (26)	36 (30)	65 (25)	54 (27)
PCEMVIS	29 (29)	49 (32)	45 (29)	35 (30)	61 (26)	54 (27)
Sociodemographic						
PCTBLK80	57 (36)	53 (32)	62 (32)	36 (29)	45 (26)	44 (29)
PCTURB70	23 (27)	33 (25)	40 (30)	31 (29)	62 (30)	55 (30)
PCTOLD75	55 (26)	52 (33)	63 (30)	48 (29)	44 (26)	48 (30)
EDUC70	20 (19)	30 (22)	27 (20)	43 (25)	64 (21)	56 (24)
UNEMP80	57 (28)	57 (27)	42 (27)	49 (31)	53 (27)	44 (29)
Number of Counties	424	65	247	299	657	933

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-11

Comparison of county characteristics based on hypothetical designation by USENEED vs. actual health manpower shortage area designations (mean percentiles and standard deviations)

	IF DESIGNATED BY USENEED			NOT DESIGNATED BY USENEED		
	Wholly Designated HMSA	Partly Designated HMSA 1/	Not Designated HMSA	Wholly Designated HMSA	Partly Designated HMSA	Not Designated HMSA
Indices						
POP/MD	76 (18)	44 (25)	45 (23)	74 (22)	33 (25)	41 (25)
POP/FTE	78 (14)	43 (26)	44 (24)	78 (15)	34 (25)	39 (25)
DAMI	83 (12)	80 (11)	80 (12)	37 (22)	28 (20)	32 (21)
USENEED	13 (8)	14 (8)	14 (8)	60 (21)	67 (21)	63 (21)
UDI	31 (24)	42 (25)	34 (23)	51 (27)	63 27	53 (29)
IMU	21 (19)	52 (24)	41 (25)	31 (22)	69 (24)	58 (26)
Mortality						
MORT7377	58 (32)	50 (29)	54 (29)	50 (32)	42 (25)	48 (28)
PCDEATHS	62 (23)	60 (23)	65 (26)	46 (28)	41 (26)	45 (30)
RI	69 (23)	68 (21)	69 (23)	43 (28)	40 (26)	43 (28)
Economic						
PCTBLPOV	73 (22)	48 (25)	60 (25)	61 (27)	31 (24)	40 (28)
PCINC77	23 (20)	43 (21)	40 (23)	35 (27)	65 (26)	60 (26)
PCAFDCP	52 (25)	62 (25)	43 (25)	40 (27)	66 (28)	42 (28)
PCOUTVIS	28 (27)	56 (30)	46 (28)	31 (29)	65 (25)	53 (27)
PCENVIS	32 (31)	55 (30)	49 (29)	32 (29)	62 (26)	53 (27)
Sociodemographic						
PCTBLK80	57 (35)	45 (33)	54 (32)	43 (33)	45 (20)	46 (30)
PCTURB70	24 (25)	46 (29)	46 (28)	28 (30)	62 (30)	54 (31)
PCTOLD75	57 (24)	56 (24)	62 (27)	48 (29)	42 (27)	47 (31)
EDUC70	22 (20)	45 (23)	38 (24)	35 (26)	64 (22)	54 (25)
UNEMP80	63 (27)	59 (27)	50 (27)	47 (30)	52 (27)	42 (29)
Number of Counties	298	143	299	425	579	881

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-12

Comparison of county characteristics based on hypothetical designation by INFANT MORTALITY vs. actual health manpower shortage area designations (mean percentiles and standard deviations)

	IF DESIGNATED BY INFANT MORTALITY			NOT DESIGNATED BY INFANT MORTALITY		
	Wholly Designated HMSA	Partly Designated HMSA 1/	Not Designated HMSA	Wholly Designated HMSA	Partly Designated HMSA	Not Designated HMSA
Indices						
POP/MD	76 (20)	38 (26)	44 (24)	75 (21)	35 (25)	42 (25)
POP/FTE	76 (16)	40 (29)	42 (24)	78 (14)	35 (25)	40 (25)
DAMI	62 (29)	51 (31)	53 (30)	52 (29)	35 (26)	41 (27)
USENEED	37 (29)	47 (30)	44 (28)	42 (29)	59 (27)	53 (28)
UDI	33 (27)	50 (31)	35 (27)	48 (26)	61 (27)	53 (28)
IMU	19 (18)	50 (26)	38 (25)	32 (21)	69 (24)	59 (25)
Mortality						
MORT7377	87 (8)	83 (7)	85 (8)	33 (22)	35 (20)	37 (21)
PCDEATHS	57 (25)	53 (26)	58 (29)	50 (28)	43 (27)	47 (30)
RI	59 (28)	52 (28)	56 (28)	51 (29)	44 (27)	47 (29)
Economic						
PCTBLPOV	75 (22)	52 (27)	62 (24)	61 (27)	31 (23)	38 (27)
PCINC77	25 (23).	52 (27)	43 (26)	33 (25)	62 (26)	59 (26)
PCAFDCP	50 (29)	60 (30)	42 (27)	42 (25)	67 (26)	42 (27)
PCOUTVIS	32 (28)	63 (28)	49 (29)	29 (29)	63 (26)	52 (27)
PCEMVIS	35 (30)	64 (28)	53 (30)	30 (29)	59 (26)	51 (27)
Sociodemographic						
PCTBLK80	51 (35)	59 (32)	59 (33)	41. (32)	42 (27)	43 (28)
PCTURB70	27 (28)	55 (32)	49 (30)	26 (28)	60 (30)	53 (30)
PCTOLD75	52 (26)	47 (29)	54 (31)	52 (28)	45 (27)	50 (30)
EDUC70	23 (19)	47 (25)	39 (23)	34 (26)	63 (23)	54 (26)
UNEMP80	55 (28)	54 (29)	42 (29)	53 (31)	53 (27)	44 (28)
Number of Counties	272	131	322	451	591	858

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-13

Comparison of county characteristics based on hypothetical designation by UDI vs. actual health manpower shortage area designations (mean percentiles and standard deviations)

	IF DESIGNATED BY UDI			NOT DESIGNATED BY UDI		
	Wholly Designated HMSA	Partly Designated HMSA 1/	Not Designated HMSA	Wholly Designated HMSA	Partly Designated HMSA	Not Designated HMSA
Indices						
POP/MD	75 (18)	42 (24)	42 (25)	75 (22)	34 (26)	42 (25)
POP/FTE	75 (14)	43 (27)	40 (25)	79 (15)	35 (25)	40 (25)
DAMI	73 (23)	58 (27)	55 (28)	46 (29)	33 (26)	39 (27)
USENEED	27 (22)	36 (24)	40 (27)	48 (29)	62 (27)	55 (27)
UDI	13 (3)	15 (9)	14 (8)	59 (20)	58 (21)	63 (21)
IMU	16 (16)	47 (27)	39 (26)	33 (21)	69 (23)	60 (24)
Mortality						
MORT7377	56 (29)	53 (28)	60 (27)	46 (32)	42 (25)	45 (27)
PCDEATHS	61 (21)	63 (24)	64 (26)	48 (29)	41 (26)	44 (30)
RI	65 (24)	64 (23)	62 (25)	48 (30)	42 (27)	44 (29)
Economic						
PCTBLPOV	32 (16)	60 (25)	66 (23)	57 (26)	29 (22)	35 (25)
PCINC77	15 (13)	36 (22)	36 (23)	38 (26)	66 (24)	63 (24)
PCAFOCP	56 (24)	61 (26)	44 (27)	39 (27)	66 (27)	41 (27)
PCOUTVIS	34 (24)	60 (24)	51 (25)	28 (30)	64 (27)	51 (29)
PCSMVIS	39 (28)	62 (26)	57 (26)	28 (30)	60 (27)	49 (28)
Sociodemographic						
PCTBLK80	70 (32)	47 (33)	60 (32)	37 (30)	45 (28)	42 (28)
PCTURB70	27 (25)	45 (27)	50 (28)	26 (29)	62 (31)	53 (31)
PCTOLD75	52 (23)	60 (26)	60 (27)	52 (29)	42 (26)	47 (31)
EDUC70	15 (13)	38 (24)	33 (22)	38 (25)	65 (21)	58 (24)
UNEMP80	64 (23)	58 (28)	47 (28)	48 (31)	52 (27)	42 (29)
Number of Counties	256	124	356	467	598	824

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-14

Comparison of characteristics of PSUs ranked when highest quartile is used as hypothetical designation cutoff for both indices 1/ (mean percentiles and standard deviations)

	IMU vs. POP/MD			
	IF DESIGNATED BY IMU		NOT DESIGNATED BY IMU	
	If Designated POP/MD	Not Designated POP/MD	If Designated POP/MD	Not Designated POP/MD
Indices				
POP/MD	90 (7)	38 (22)	85 (7)	36 (21)
RAMI	82 (14)	54 (30)	49 (27)	44 (27)
USENEED	21 (20)	53 (29)	33 (24)	58 (27)
UDI	20 (22)	56 (24)	27 (21)	59 (28)
IMU	12 (7)	12 (7)	61 (19)	62 (22)
Insufficient Capacity/Excess Demand				
Change in MDs accepting no new patients	61 (23)	54 (29)	46 (28)	44 (29)
Change in days wait for appt. (estab. pat.)	53 (29)	51 (30)	55 (31)	47 (28)
Change in pat. wait time in office	47 (27)	52 (32)	42 (30)	52 (28)
Change in % MDs accepting Medicaid patients	50 (27)	42 (31)	55 (30)	50 (28)
Change in % Medicaid pats. in MDs practice	57 (29)	44 (29)	55 (28)	48 (29)
Change in charge for routine office visits	42 (26)	46 (32)	45 (29)	53 (28)
Utilization/Demand				
Charge for routine office visit	25 (22)	54 (29)	37 (28)	56 (27)
% Medicaid pats. in MD practice	62 (28)	42 (27)	44 (26)	45 (28)
% pats. with private insurance	38 (38)	40 (41)	34 (38)	33 (40)
Patient wait time in office	58 (25)	54 (30)	60 (27)	44 (28)
Days wait for appt. (estab. pat.)	51 (30)	52 (30)	58 (28)	48 (28)
ACCESS				
Travel time (min.)	57 (30)	46 (27)	41 (26)	52 (30)
% pats. receiving discounts	47 (28)	54 (30)	44 (31)	50 (28)
% MDs giving discounts	47 (27)	56 (31)	38 (24)	51 (29)
% MDs accepting Medicaid	67 (26)	47 (31)	56 (27)	46 (28)
% MDs accepting Medicare	51 (34)	48 (30)	49 (27)	50 (28)
Supply/Avail./Productivity				
Pats. seen/hour	56 (32)	54 (33)	55 (28)	46 (27)
Pats. seen/week	57 (28)	49 (28)	56 (29)	46 (29)
Change in pats. seen/hour	55 (28)	56 (34)	51 (30)	46 (27)
Change in pats. seen/week	42 (31)	51 (31)	43 (28)	52 (28)
OTHER				
MORT7377	68 (30)	53 (24)	58 (32)	44 (27)
POP79	36 ([illegible])	53 (30)	36 (18)	55 (31)
Number of PSUs	21	42	44	144

1/ PSUs refer to Primary Sampling Units consisting of groups of contiguous counties constructed by Mathematica Policy Research, Princeton, New Jersey.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-15

Comparison of characteristics of PSUs ranked when highest quartile is used as hypothetical designation cutoff for both indices 1/ (mean percentiles and standard deviations)

	DAMI vs. POP/MD			
	IF DESIGNATED BY DAMI		NOT DESIGNATED BY DAMI	
	If Designated POP/MD	Not Designated POP/MD	If Designated POP/MD	Not Designated POP/MD
Indices				
POP/MD	88 (8)	52 (17)	85 (7)	33 (21)
DAMI	86 (7)	87 (8)	35 (16)	37 (22)
USENEED	27 (21)	37 (22)	32 (25)	61 (26)
UDI	21 (21)	42 (22)	29 (21)	62 [illegible]
IMU	30 (25)	34 (23)	[illegible] (23)	55 (29)
Insufficient Capacity/Excess Demand				
Change in MDs accepting no new patients	59 (27)	54 (28)	44 (25)	46 (29)
Change in days wait for appt. (estab. pat.)	46 (30)	46 (29)	63 (28)	48 (28)
Change in pat. wait time in office	46 (27)	47 (27)	41 (31)	53 (29)
Change in % MDs accepting Medicaid patients	57 (27)	46 (28)	50 (31)	49 (29)
Change in % Medicaid pats. in MDs practice	60 (28)	52 (31)	52 (28)	46 (28)
Change in charge for routine office visits	44 (27)	50 (31)	44 (28)	52 (29)
Utilization/Demand				
Charge for routine office visit	31 (25)	44 (33)	36 (27)	58 (26)
% Medicaid pats. in MD practice	63 (28)	54 (29)	64 (26)	42 (27)
% pats. with private insurance	40 (37)	36 (41)	30 (38)	34 (40)
Patient wait time in office	60 (25)	43 (30)	59 (28)	47 (29)
Days wait for appt. (estab. pat.)	49 (29)	44 (28)	52 (28)	48 (29)
ACCESS				
Travel time (min.)	48 (29)	45 (29)	45 (28)	52 (29)
% pats. receiving discounts	43 (27)	51 (28)	46 (33)	51 (28)
% MDs giving discounts	44 (24)	48 (30)	38 (26)	53 (29)
% MDs accepting Medicaid	64 (25)	60 (25)	55 (28)	43 (29)
% MDs accepting Medicare	47 (31)	54 (28)	52 (28)	49 (29)
Supply/Avail./Productivity				
Pats. seen/hour	54 (29)	47 (33)	57 (29)	48 (28)
Pats. seen/week	56 (29)	46 (34)	57 (29)	47 (27)
Change in pats. seen/hour	52 (28)	43 (31)	53 (30)	50 (28)
Change in pats. seen/week	42 (31)	36 (27)	44 (28)	55 (28)
OTHER				
MORT7377	61 (31)	45 (26)	58 (33)	46 (27)
POP79	35 (14)	20 (14)	36 (16)	62 (29)
Number of PSUs	32	33	33	153

1/ PSUs refer to Primary Sampling Units consisting of groups of contiguous counties constructed by Mathematica Policy Research, Princeton, New Jersey.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-16

Comparison of characteristics of PSUs ranked when highest quartile is used as hypothetical designation cutoff for both indices 1/ (mean percentiles and standard deviations)

UDI vs. POP/MD

	IF DESIGNATED BY UDI		NOT DESIGNATED BY UDI	
	If Designated POP/MD	Not Designated POP/MD	If Designated POP/MD	Not Designated POP/MD
Indices				
POP/MD	87 (8)	52 (17)	86 (7)	34 (21)
DAMI	66 (25)	53 (25)	51 (30)	45 (29)
USENEED	17 (13)	[illegible] (21)	48 (23)	61 (26)
UDI	11 (8)	15 (6)	48 (18)	65 (21)
IMU	40 (26)	53 (25)	52 (30)	51 (30)
Insufficient Capacity/Excess Demand				
Change in MDs accepting no new patients	53 (29)	48 (23)	49 (24)	48 (30)
Change in days wait for appt. (estab. pat.)	49 (34)	49 (31)	63 (23)	48 (28)
Change in pat. wait time in office	39 (28)	45 (24)	51 (29)	53 (29)
Change in % MDs accepting Medicaid patients	51 (30)	47 (27)	56 (28)	48 (29)
Change in % Medicaid pats. in MDs practice	59 (29)	54 (30)	51 (27)	46 (29)
Change in charge for routine office visits	44 (27)	43 (28)	44 (29)	53 (29)
Utilization/Demand				
Charge for routine office visit	26 (22)	34 (30)	44 (29)	58 (26)
% Medicaid pats. in MD practice	66 (27)	59 (26)	60 (28)	35 (40)
% pats. with private insurance	41 (36)	26 (38)	25 (36)	35 (40)
Patient wait time in office	63 (26)	45 (30)	54 (27)	46 (29)
Days wait for appt. (estab. pat.)	54 (30)	51 (34)	58 (27)	47 (28)
ACCESS				
Travel time (min.)	51 (28)	52 (30)	39 (30)	50 (29)
% pats. receiving discounts	39 (27)	56 (30)	53 (33)	50 (28)
% MDs giving discounts	39 (24)	51 (31)	45 (26)	53 (30)
% MDs accepting Medicaid	59 (27)	59 (23)	61 (28)	44 (29)
% MDs accepting Medicare	45 (29)	46 (26)	58 (29)	50 (29)
Supply/Avail./Productivity				
Pats. seen/hour	54 (30)	58 (22)	55 (30)	46 (29)
Pats. seen/week	60 (26)	52 (33)	51 (32)	46 (28)
Change in pats. seen/hour	51 (30)	44 (28)	54 (28)	49 (29)
Change in pats. seen/week	37 (29)	41 (28)	51 (28)	53 (28)
OTHER				
MORT7377	68 (31)	50 (31)	47 (30)	48 (26)
POP79	39 (13)	27 (21)	31 (18)	58 (30)
Number of PSUs	39	24	26	162

1/ PSUs refer to Primary Sampling Units consisting of groups of contiguous counties constructed by Mathematica Policy Research, Princeton, New Jersey.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-17

Comparison of characteristics of counties ranked when highest quartile is used as hypothetical designation cutoff for both indices (mean percentiles and standard deviations)

	IMU vs. POP/FTE			
	IF DESIGNATED BY IMU		NOT DESIGNATED BY IMU	
	If Designated POP/FTE	Not Designated POP/FTE	If Designated POP/FTE	Not Designated POP/FTE
Indices				
POP/FTE	87 (7)	53 (15)	86 (8)	35 (22)
DAMI	65 (26)	67 (27)	39 (28)	38 (27)
USENEED	30 (25)	27 (23)	58 (30)	56 (27)
UDI	25 (22)	21 (21)	61 (24)	58 (26)
IMU	11 (7)	14 (7)	40 (13)	65 (21)
Perceived Health/Perceived Need				
Perceived health	68 (28)	70 (30)	35 (26)	41 (26)
Percent limitation	62 (30)	68 (29)	38 (26)	45 (27)
Utilization/Demand				
Total MD visits (annual)	44 (29)	52 (28)	57 (32)	49 (28)
Number of Counties in HIS sample 1/	71	42	42	299

1/ County sample used by National Center for Health Statistics in their Health Interview Survey.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-18

Comparison of characteristics of counties ranked when highest quartile is used as hypothetical designation cutoff for both indices (mean percentiles and standard deviations)

	DAMI vs. POP/FTE			
	IF DESIGNATED BY DAMI		NOT DESIGNATED BY DAMI	
	If Designated POP/FTE	Not Designated POP/FTE	If Designated POP/FTE	Not Designated POP/FTE
Indices				
POP/FTE	87 (6)	46 (20)	87 (8)	34 (21)
DAMI	85 (9)	82 (9)	35 (20)	30 (20)
USENEED	13 (11)	15 (9)	59 (23)	64 (21)
UDI	21 (17)	28 (20)	50 (29)	61 (26)
IMU	14 (14)	38 (23)	27 (17)	65 (23)
Perceived Health/Perceived Need				
Perceived health	71 (27)	63 (27)	45 (30)	39 (25)
Percent limitation	65 (30)	60 (30)	44 (28)	44 (27)
Utilization/Demand				
Total MD visits (annual)	46 (29)	47 (28)	51 (31)	50 (29)
Number of Counties in HIS sample 1/	46	79	67	262

1/ County sample used by National Center for Health Statistics in their Health Interview Survey.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-19

Comparison of characteristics of counties ranked when highest quartile is used as hypothetical designation cutoff for both indices (mean percentiles and standard deviations)

	UDI vs. POP/FTE			
	IF DESIGNATED BY UDI		NOT DESIGNATED BY UDI	
	If Designated POP/FTE	Not Designated POP/FTE	If Designated POP/FTE	Not Designated POP/FTE
Indices				
POP/FTE	87 (6)	47 (18)	87 (8)	34 (22)
DAMI	70 (26)	67 (23)	46 (29)	35 (26)
USENEED	25 (23)	28 (20)	51 (30)	59 (26)
UDI	11 (7)	13 (7)	57 (22)	63 (21)
IMU	11 (12)	33 (23)	29 (17)	65 (22)
Perceived Health/Perceived Need				
Perceived health	72 (29)	64 (29)	45 (28)	39 (25)
Percent limitation	65 (31)	59 (31)	45 (28)	45 (27)
Utilization/Demand				
Total MD visits (annual)	41 (28)	40 (28)	54 (31)	52 (28)
Number of Counties in HIS sample 1/	45	69	68	272

1/ County sample used by National Center for Health Statistics in their Health Interview Survey.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-20

Means and standard deviations for variables in correlation analysis (Table 1)

	Mean	Standard Deviation
INDICES		
POPFTE 1/	3,371	4,529
POP/MD 1/	2,672	1,803
DAMI 1/	.0133	.0039
UDI 1/	-.2795	.2837
IMU 1/	63	13
USENEED 1/	10	3
SOCIODEMOGRAPHIC		
PCTBLPOV 1/	19.9	10.4
EDUC70 1/	10.9	1.3
PCT BLACK 1/	8.1	13.1
PCT URBAN 1/	37.1	28.5
PCINC 1/	$4,736	982
UNEMP80 1/	7.5	3.4
PCT OLD 1/	12.3	3.8
HEALTH STATUS/CLINICAL NEED		
Infant Mortality 1/	16.2	5.2
RI-Mortality Rate 1/	28.0	3.7
Per Capita Deaths 1/	9.9	2.5
PERCEIVED HEALTH/PERCEIVED NEED		
Perceived health 3/	.33	.06
Percent limitation 3/	.30	.06
INSUFF. CAPACITY/EXCESS DEMAND		
OP visits (PC) 1/	.73	.98
ER visits (PC) 1/	.27	.22
Change in % of MDs accepting no new pats. 2/	-3	5
Change in days wait for appt. (estab. pat.) 2/	-1.6	3.0
Change in pat. wait time in office (min.) 2/	-3	5
Change in % MDs accepting Medicaid pats. 2/	.8	15
Change in % Medicaid pats. in MDs prac. 2/	.7	5
Change in charge for routine office visits ($) 2/	4.71	1.51
Change in % Medicare pats. in MDs prac. 2/	6	8
UTILIZATION/DEMAND		
Total MD visits (annual) 3/	3.3	.6
Charge for routine office visit ($) 2/	14.57	2.50
% Medicaid pats. in MD practice 2/	16	7
% pats. with private insurance 2/	3	4
% Medicare pats. in MD practice 2/	38	8
Patient wait time in office (min.) 2/	22	5
Days wait for appt. (estab. pat.) 2/	3	2
ACCESS		
Travel time (min.) 2/	20	4
% pats. receiving discounts 2/	3	2
% MDs giving discounts 2/	54	14
Per capita AFDC payments 1/	2.25	1.89
% MDs accepting Medicaid 2/	66	21
% MDs accepting Medicare 2/	16	7
SUPPLY/AVAIL./PRODUCTIVITY		
POP/MD 1/	2,676	1,803
POP/FTE 1/	3,371	4,529
Pats. seen/hour 2/	5	1
Pats. seen/week 2/	119	25
Change in pats. seen/hour 2/	.02	.7
Change in pats. seen/week 2/	-9.2	19

1/ N=2600
2/ N=251
3/ N=454
Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-21

Comparison of county characteristics based on hypothetical designation by POP/MD vs. actual health manpower shortage area designations (actual mean values)

	IF DESIGNATED BY POP/MD			NOT DESIGNATED BY POP/MD		
Indices	Wholly Designated HMSA	Partly Designated HMSA 1/	Not Designated HMSA	Wholly Designated HMSA	Partly Designated HMSA	Not Designated HMSA
POP/MD	5,106	4,430	4,280	2,354	1,753	1,935
POP/FTE	5,491	4,924	4,423	4,978	2,278	2,520
DAMI	.0148	.0137	.0134	.0143	.0121	.0130
USENEED	9.05	9.68	10.16	9.34	10.89	10.08
UDI	-.34	-.27	-.25	-.34	-.19	-.30
IMU	51.43	57.53	57.68	55.90	71.52	65.81
Mortality						
MORT7377	17.1	15.3	16.3	17.0	15.3	16.2
PCDEATHS	10.0	9.4	9.6	10.4	9.5	10.1
RI	28.37	27.12	27.2	28.75	27.55	28.05
Economic						
PCTBLPOV	27.3	20.7	21.2	24.6	14.9	18.1
PCINC77	$4,000	4,400	4,609	4,321	5,187	4,942
PCAFDCP	1.39	2.67	1.55	1.97	3.41	1.83
Socio-demographic						
PCTBLK80	11.5	6.3	9.2	10.3	6.3	7.1
PCTURB70	16.0	21.0	27.6	27.0	51.8	42.3
PCTOLD75	12.3	11.3	11.9	13.1	11.7	12.7
EDUC70	9.3	10.8	10.6	10.4	11.6	11.2
UNEMP80	8.3	8.2	7.0	7.7	7.9	6.9
Excess Demand						
PCOUTVIS	.34	.52	.54	.61	1.06	.79
PCEMVIS	.15	.20	.20	.23	.36	.31
Region						
NORTHEAST	1	8	1	2	23	4
MIDWEST	25	30	33	28	31	40
SOUTH	68	38	60	57	24	45
WEST	6	24	7	14	22	10
County Type						
(Small) Non-SMSA	87	76	77	89	58	75
(Medium) Potential SMSA	1	3	0	0	2	2
(Large) SMSA	12	21	23	11	40	23
Number of counties	489	76	159	234	646	1021

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-22

Comparison of county characteristics based on hypothetical designation by IMU vs. actual health manpower shortage area designations (actual mean values)

	IF DESIGNATED BY IMU (High Underservice)			NOT DESIGNATED BY IMU (Low Underservice)		
	Wholly Designated HMSA	Partly Designated HMSA 1/	Not Designated HMSA	Wholly Designated HMSA	Partly Designated HMSA	Not Designated HMSA
Indices						
POP/MD	4,481	3,257	2,674	3,675	1,908	2,121
POP/FTE	5,232	4,345	3,440	5,426	2,377	2,598
DAMI	.0157	.0150	.0150	.0131	.0120	.0125
USENEED	8.57	8.90	8.79	9.95	10.94	10.43
UDI	-.42	-.43	-.47	-.23	-.17	-.24
IMU	45.53	46.97	47.61	63.17	72.29	69.17
Mortality						
MORT7377	18.3	18.5	18.6	15.3	15.0	15.6
PCDEATHS	10.5	10.8	11.6	9.5	9.4	9.6
RI	29.19	28.48	29.80	27.51	27.41	27.45
Economic						
PCTBLPOV	31.9	30.3	29.9	18.6	14.1	15.6
PCINC77	$3,750	-3,958	4,128	4,599	5,216	5,097
PCAFDCP	2.15	2.51	1.71	1.59	3.41	1.81
Socio-demographic						
PCTBLK80	16.2	12.4	15.7	4.0	5.7	5.3
PCTURB70	15.7	24.0	30.5	23.5	51.0	43.5
PCTOLD75	12.8	13.1	14.7	12.1	11.5	12.1
EDUC70	9.5	10.1	10.0	10.8	11.7	11.4
UNEMP80	8.5	8.3	6.6	7.5	7.9	7.0
Excess Demand						
PCOUTVIS	.37	.68	.52	.51	1.03	.82
PCEMVIS	.16	.28	.25	.19	.35	.30
Region						
NORTHEAST	0	0	0	3	23	5
MIDWEST	15	14	15	42	33	46
SOUTH	81	69	83	41	21	38
WEST	4	17	2	14	23	12
County Type						
(Small) Non-SMSA	92	89	93	82	57	71
(Medium) Potential SMSA	1	0	0	0	2	2
(Large) SMSA	7	11	7	18	41	27
Number of counties	422	64	244	301	658	936

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-23

Comparison of county characteristics based on hypothetical designation by USENEED vs. actual health manpower shortage area designations (actual mean values)

	IF DESIGNATED BY USENEED			NOT DESIGNATED BY USENEED		
	Wholly Designated HMSA	Partly Designated HMSA 1/	Not Designated HMSA	Wholly Designated HMSA	Partly Designated HMSA	Not Designated HMSA
Indices						
POP/MD	4,207	2,330	2,295	4,090	1,954	2,213
POP/FTE	5,139	2,794	2,771	5,441	2,486	2,770
DAMI	.0185	.0174	.0176	.0120	.0111	.0115
USENEED	6.83	7.0	7.0	10.72	11.6	11.1
UDI	-.45	-.35	-.42	-.27	-.16	-.25
IMU	49.68	64.23	59.30	55.05	71.47	66.53
Mortality						
MORT7377	17.9	16.2	16.9	16.5	15.0	16.0
PCDEATHS	10.8	10.7	11.3	9.6	9.2	9.6
RI	30.29	30.12	30.42	27.26	26.30	27.10
Economic						
PCTBLPOV	29.4	19.4	23.2	24.3	14.6	17.0
PCINC77	$3,867	4,524	4,397	4,265	5,247	5,064
PCAFDCP	2.20	2.98	1.74	1.73	3.42	1.81
Socio-demographic						
PCTBLK80	16.6	8.9	11.2	7.4	5.6	6.1
PCTURB70	17.8	35.4	34.5	20.7	51.8	42.9
PCTOLD75	13.1	12.9	14.1	12.2	11.4	12.1
EDUC70	9.6	10.9	10.5	10.3	11.7	11.3
UNEMP80	9.0	8.5	7.4	7.5	7.8	6.7
Excess Demand						
PCOUTVIS	.35	1.02	.66	.48	1.00	.79
PCEMVIS	.17	.33	.27	.17	.34	.30
Region						
NORTHEAST	1	29	2	1	19	5
MIDWEST	24	25	34	28	32	41
SOUTH	73	42	59	58	21	43
WEST	2	4	5	13	27	11
County Type						
(Small) Non-SMSA	91	82	89	85	55	71
(Medium) Potential SMSA	0	1	1	1	2	2
(Large) SMSA	9	17	10	14	43	27
Number of counties	293	142	296	430	580	884

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-24

Comparison of county characteristics based on hypothetical designation by INFANT MORTALITY vs. actual health manpower shortage area designations (actual mean values)

	IF DESIGNATED BY INFANT MORTALITY			NOT DESIGNATED BY INFANT MORTALITY		
	Wholly Designated HMSA	Partly Designated HMSA 1/	Not Designated HMSA	Wholly Designated HMSA	Partly Designated HMSA	Not Designated HMSA
Indices						
POP/MD	4,248	2,210	2,256	4,070	2,008	2,226
POP/FTE	4,935	3,047	2,687	5,545	2,437	2,801
DAMI	.0157	.0140	.0143	.0140	.0119	.0125
USENEED	8.83	9.83	9.45	9.33	10.96	10.34
UDI	-.43	-.27	-.41	-.29	-.18	-.25
IMU	48.42	63.25	58.09	55.54	71.56	67.20
Mortality						
MORT7377	23.4	21.4	22.3	13.2	13.9	13.9
PCDEATHS	10.45	10.1	10.7	9.9	9.4	9.7
RI	29.03	28.30	28.78	28.17	27.33	27.61
Economic						
PCTBLPOV	30.0	20.7	24.0	24.2	14.4	16.5
PCINC77	$3,928	4,843	4,537	4,207	5,163	5,032
PCAFDCP	2.20	3.40	1.79	1.75	3.32	1.79
Socio-demographic						
PCTBLK80	18.5	14.6	14.1	6.8	4.4	4.9
PCTURB70	20.0	45.7	38.4	19.2	49.2	41.7
PCTOLD75	12.5	11.9	13.3	12.5	11.6	12.4
EDUC70	9.7	11.0	10.6	10.2	11.7	11.3
UNEMP80	8.1	8.1	6.8	8.1	7.9	7.0
Excess Demand						
PCOUTVIS	.48	1.19	.78	.40	.96	.75
PCERVIS	.20	.40	.32	.16	.33	.28
Region						
NORTHEAST	1	8	1	1	24	5
MIDWEST	15	23	22	33	33	46
SOUTH	78	50	68	56	20	39
WEST	6	18	9	10	23	10
County Type						
(Small) Non-SMSA	93	69	91	84	58	70
(Medium) Potential SMSA	0	2	2	1	2	2
(Large) SMSA	7	29	7	15	40	28
Number of counties	272	131	322	452	591	358

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-25

Comparison of county characteristics based on hypothetical designation by UDI vs. actual health manpower shortage area designations (actual mean values)

	IF DESIGNATED BY UDI			NOT DESIGNATED BY UDI		
	Wholly Designated nMSA	Partly Designated nMSA 1/	Not Designated nMSA	Wholly Designated nMSA	Partly Designated nMSA	Not Designated nMSA
Indices						
POP/MD	4,051	2,271	2,198	4,190	1,980	2,249
POP/FTE	4,661	3,047	2,592	5,702	2,444	2,346
DAMI	.0173	.0148	.0146	.0132	.0118	.0124
USENEED	7.86	8.67	9.03	9.34	11.18	10.55
UDI	-.61	-.61	-.60	-.20	-.11	-.16
IMU	46.75	61.61	58.27	56.17	71.73	67.46
Mortality						
MORT7377	19.7	16.6	17.9	15.7	15.0	15.5
PCDEATHS	10.7	10.9	11.2	9.3	9.2	9.5
RI	29.83	29.59	29.47	27.77	27.09	27.28
Economic						
PCTBLPOV	33.9	24.0	25.7	22.3	13.8	15.5
PCINC77	$3,596	4,291	4,292	4,377	5,267	5,154
PCAFDCP	2.37	2.82	1.86	1.67	3.43	1.76
Socio-demographic						
PCTBLK80	23.8	9.7	14.1	4.3	5.6	4.6
PCTURB70	20.0	34.1	38.3	19.3	51.5	41.8
PCTOLD75	12.4	13.5	13.9	12.6	11.3	12.1
EDUC70	9.2	10.5	10.3	10.5	11.8	11.4
UNEMP80	9.2	8.5	7.2	7.5	7.9	6.8
Excess Demand						
PCOUTVIS	.40	.89	.72	.44	1.02	.78
PCEMVIS	.21	.35	.33	.15	.34	.28
Region						
NORTHEAST	0	5	1	2	25	5
MIDWEST	8	38	25	36	30	46
SOUTH	91	52	72	50	20	36
WEST	1	5	2	13	26	13
County Type						
(Small) Non-SMSA	98	93	93	82	54	68
(Medium) Potential SMSA	0	2	2	1	2	2
(Large) SMSA	2	5	5	17	44	30
Number of counties	253	120	352	470	602	928

1/ Partly designated counties, counties in which only a subcounty area has been designated, are included to preserve the mutual exclusivity of the groups of wholly and not-designated counties. No inferences can be made about subcounty areas based upon county-level data. Only gross associations can be made between partly designated counties and wholly and not-designated counties, and those counties potentially designatable using alternative indices.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-26

Comparison of characteristics of PSUs ranked when highest quartile is used as hypothetical designation cutoff for both indices (actual mean values)

	IMU vs. POP/MD			
	IF DESIGNATED BY IMU		NOT DESIGNATED BY IMU	
	If Designated POP/MD	Not Designated POP/MD	If Designated POP/MD	Not Designated POP/MD
Indices				
POP/MD	2,086	1,352	2,376	1,380
BAMI	.2269	.0898	.0868	.0717
USENEED	13.09	17.10	14.37	18.00
UDI	-.30	.04	-.21	.07
IMU	51.49	51.92	72.61	73.69
Insufficient Capacity/Excess Demand				
Change in % MDs accepting no new patients	-.7	-1.8	-3.9	-2.8
Change in days wait for appt. (estab. pat.)	-1.1	-1.2	-1.3	-1.9
Change in pat. wait time in office (minutes)	-3.8	-2.2	-3.7	-2.1
Change in % MDs accepting Medicaid patients	.7	-2.8	3.5	1.0
Change in % Medicaid pats. in MDs practice	2.3	-.1	1.2	.6
Change in charge for routine office visits	$4.50	$4.59	$4.53	$4.83
Utilization/Demand				
Charge for routine office visit	$12.69	$14.87	$13.57	$15.04
% Medicaid pats. in MD practice	19.00	14.03	19.40	14.75
% pats. with private insurance	1.99	3.10	1.88	2.67
Patient wait time in office (minutes)	23.03	22.49	23.63	20.98
Days wait for appt. (estab. pat.)	3.29	3.50	3.86	3.14
ACCESS				
Travel time (minutes)	19.92	18.96	18.35	19.97
% pats. receiving discounts	2.89	3.35	2.91	3.23
% MDs giving discounts	52.51	58.00	49.31	55.23
% MDs accepting Medicaid	70.46	62.89	72.62	63.49
% MDs accepting Medicare	56.98	55.77	56.62	56.02
Supply/Avail./Productivity				
Pats. seen/hour	5.30	5.26	5.38	5.03
Pats. seen/week	126.0	118.51	125.38	115.52
Change in pats. seen/hour	.17	.16	.03	-.06
Change in pats. seen/week	-14.7	-9.5	-13.3	-7.2
OTHER				
MDRT7377	18.2	16.0	16.6	15.1
POP79	201,425	524,776	204,067	814,450
Number of PSUs	21	42	42	146

1/ PSUs refer to Primary Sampling Units consisting of groups of contiguous counties constructed by Mathematica Policy Research, Princeton, New Jersey.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-27

Comparison of characteristics of PSUs ranked when highest quartile is used as hypothetical designation cutoff for both indices 1/ (actual mean values)

	DAMI vs. POP/MD			
	IF DESIGNATED BY DAMI		NOT DESIGNATED BY DAMI	
	If Designated POP/MD	Not Designated POP/MD	If Designated POP/MD	Not Designated POP/MD
Indices				
POP/MD	2,544	1,611	2,415	1,296
DAMI	.2381	.2710	.0308	.0367
USENEED	13.60	14.86	14.28	18.40
UDI	-.29	-.07	-.20	.09
IMU	58.98	62.28	71.96	70.17
Insufficient Capacity/Excess Demand				
Change in % MDs accepting no new patients	-1.5	-1.7	-4.2	-2.8
Change in days wait for appt. (estab. pat.)	-1.9	-1.7	-.5	-1.8
Change in pat. wait time in office (minutes)	-3.4	-2.9	-4.0	-2.0
Change in % MDs accepting Medicaid patients	4.0	.03	1.13	.20
Change in % Medicaid pats. in MDs practice	2.4	1.0	.7	.3
Change in charge for routine office visits	$4.56	$4.82	$4.49	$4.77
Utilization/Demand				
Charge for routine office visit	$13.07	$14.23	$13.47	$15.16
% Medicaid pats. in MD practice	19.28	17.60	19.26	13.97
% pats. with private insurance	2.22	2.78	1.63	2.76
Patient wait time in office (minutes)	23.43	20.89	23.42	21.41
Days wait for appt. (estab. pat.)	3.17	3.13	4.16	3.24
ACCESS				
Travel time (minutes)	19.17	18.87	18.59	19.93
% pats. receiving discounts	2.83	3.02	2.97	3.30
% MDs giving discounts	51.97	52.29	48.83	56.58
% MDs accepting Medicaid	77.64	74.59	71.59	61.05
% MDs accepting Medicare	56.38	59.13	58.06	55.31
Supply/Avail./Productivity				
Pats. seen/hour	5.25	5.03	5.50	5.09
Pats. seen/week	124.33	116.17	126.80	116.19
Change in pats. seen/hour	.06	-.10	.09	.02
Change in pats. seen/week	-15.5	-17.7	-12.0	-8.7
OTHER				
MDRY7377	17.3	15.2	16.8	15.3
POP79	195,514	154,063	210,604	871,924
Number of PSUs	31	32	32	156

1/ PSUs refer to Primary Sampling Units consisting of groups of contiguous counties constructed by Mathematica Policy Research, Princeton, New Jersey.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-28

Comparison of characteristics of PSUs ranked when highest quartile is used as hypothetical designation cutoff for both indices 1/ (actual mean values)

UDI vs. POP/MD

	IF DESIGNATED BY UDI		NOT DESIGNATED BY UDI	
	If Designated POP/MD	Not Designated POP/MD	If Designated POP/MD	Not Designated POP/MD
Indices				
POP/MD	2,908	1,636	2,435	1,306
DAMI	.1543	.0888	.1001	.0737
USENEED	12.62	13.84	15.95	18.41
UDI	-.38	-.32	-.03	.12
IMU	63.83	69.76	68.21	60.68
Insufficient Capacity/Excess Demand				
Change in % MDs accepting no new patients	-2.8	-2.4	-3.0	-2.6
Change in days wait for appt. (estab. pat.)	-1.6	-1.4	-.6	-1.8
Change in pat. wait time in office (minutes)	-4.8	-2.8	-2.0	-2.0
Change in % MDs accepting Medicaid patients	1.6	-.4	3.9	.3
Change in % Medicaid pats. in MDs practice	2.1	2.0	.8	.2
Change in charge for routine office visits	$4.48	$4.66	$4.59	$4.80
Utilization/Demand				
Charge for routine office visit	$12.71	$13.62	$14.13	$15.21
% Medicaid pats. in MD practice	19.86	18.21	18.37	14.03
% pats. with private insurance	2.36	1.77	1.24	2.92
Patient wait time in office (minutes)	24.06	21.00	22.46	21.37
Days wait for appt. (estab. pat.)	3.60	3.36	3.79	3.20
ACCESS				
Travel time (minutes)	19.38	19.83	18.10	19.73
% pats. receiving discounts	2.52	3.49	3.40	3.22
% MDs giving discounts	40.23	58.61	52.11	56.89
% MDs accepting Medicaid	73.82	72.86	75.70	61.90
% MDs accepting Medicare	54.93	53.96	80.49	56.27
Supply/Avail./Productivity				
Pats. seen/hour	5.38	5.23	5.37	5.06
Pats. seen/week	127.33	120.26	122.94	115.57
Change in pats. seen/hour	.06	-.09	.10	.01
Change in pats. seen/week	-16.8	-15.0	-8.2	-6.6
OTHER				
MORT7377	18.0	16.8	15.6	15.2
POP79	207,893	201,099	196,014	833,882
Number of PSUs	38	25	25	163

1/ PSUs refer to Primary Sampling Units consisting of groups of contiguous counties constructed by Mathematica Policy Research, Princeton, New Jersey.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-29

Comparison of characteristics of counties ranked when highest quartile is used as hypothetical designation cutoff for both indices (actual mean values)

	IMU vs. POP/FTE			
	IF DESIGNATED BY IMU		NOT DESIGNATED BY IMU	
	If Designated POP/FTE	Not Designated POP/FTE	If Designated POP/FTE	Not Designated POP/FTE
Indices				
POP/FTE	5,902	2,228	8,131	1,826
DAMI	.0142	.0145	.0109	.0109
USENEED	9.49	9.14	12.85	12.44
UDI	-.36	-.39	-.01	-.03
IMU	55.20	58.58	71.03	78.54
Perceived Health/Perceived Need				
Perceived health	.3759	.3814	.2990	.3186
Percent limitation	.3210	.3410	.2763	.2904
Utilization/Demand				
Total MD visits (annual)	3.21	3.36	3.50	3.31
Number of Counties in HIS sample 1/	71	42	42	299

1/ County sample used by National Center for Health Statistics in their Health Interview Survey.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-30

Comparison of characteristics of counties ranked when highest quartile is used as hypothetical designation cutoff for both indices (actual mean values)

	DAMI vs. POP/FTE			
	IF DESIGNATED BY DAMI		NOT DESIGNATED BY DAMI	
	If Designated POP/FTE	Not Designated POP/FTE	If Designated POP/FTE	Not Designated POP/FTE
Indices				
POP/FTE	5,104	2,085	7,847	1,812
DAMI	.0167	.0160	.0104	.0099
USENEED	7.76	8.05	12.78	13.25
UDI	-.40	-.32	-.11	-.00
IMU	56.27	68.22	64.39	78.46
Perceived Health/Perceived Need				
Perceived health	.3863	.3654	.3206	.3145
Percent limitation	.3280	.3209	.2881	.2893
Utilization/Demand				
Total MD visits (annual)	3.23	3.25	3.38	3.34
Number of Counties in HIS sample 1/	46	79	67	262

1/ County sample used by National Center for Health Statistics in their Health Interview Survey.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Table D-31

Comparison of characteristics of counties ranked when highest quartile is used as hypothetical designation cutoff for both indices (actual mean values)

	UDI vs. POP/FTE			
	IF DESIGNATED BY UDI		NOT DESIGNATED BY UDI	
	If Designated POP/FTE	Not Designated POP/FTE	If Designated POP/FTE	Not Designated POP/FTE
Indices				
POP/FTE	4,005	2,110	8,534	1,816
DAMI	.0149	.0142	.0118	.0106
USENEED	8.96	9.17	11.92	12.77
UDI	-.51	-.47	-.04	.02
IMU	53.99	66.14	65.77	78.61
Perceived Health/Perceived Need				
Perceived health	.3833	.3684	.3235	.3156
Percent limitation	.3276	.3207	.2890	.2905
Utilization/Demand				
Total MD visits (annual)	3.11	3.13	3.46	3.36
Number of Counties in HIS sample 1/	45	69	68	272

1/ County sample used by National Center for Health Statistics in their Health Interview Survey.

Source: Health Resources Administration, Bureau of Health Professions, Division of Health Professions Analysis: computer tabulations.

Appendix E. Measures Used to Identify Alternative Types of Shortage

APPENDIX E

Case Studies of Selected Local Areas

As indicated in Chapter IV, a number of local area case studies were conducted in New York, Los Angeles and rural West Virginia. These case studies were conducted under contract specifically for this report and were aimed at providing local area views of the HMSA criteria and their application. They dealt not only with the accuracy with which the criteria had been applied, but also examined additional statistical indicators of shortage, beyond those of the HMSA criteria, which might support or contradict the official findings of shortage or nonshortage arrived at by using the criteria. In addition, a number of local officials were interviewed during the course of the case studies and their views on the appropriateness, utility, and applicability of the current criteria were sought, together with their suggestions for possible changes. A list of the areas included in the case studies follows this appendix.

To assist them in seeking the additional statistical indicators, the individuals who conducted the site visits were provided with a specific set of descriptions of 19 types of measures of primary care availability, utilization, need, demand, unmet need, and unmet demand, as well as a listing of the variables which could be used to quantify some aspect of these measures. The types of measures for which data was being sought in the local areas visited were:

Infant and related mortality rates; Preventable death rate; Middle age mortality rate; Index of Medical Underservice; Utilization Deficit Index; Index of Deaths Averted by Medical Expenditures; Medicaid coverage of the poverty population; Medicaid eligible utilization rate (for ambulatory care); Emergency room visits per capita; Outpatient clinic visits per capita; Population to primary care physician ratio; Predicted PCHMSA area population share index; Income per capita; Percent of households headed by women; Teenage fertility rate; Unemployment rate; Percent of the population ages 65 and over; Primary care physician openings per capita and per active practitioner; and Market tightness.

In development of the above list, it was recognized that data on most of these measures would not be available in local areas and that there was also substantial duplication in the conceptual bases of the different measures. However, it was felt that data for all the measures would not be necessary to yield a reasonably adequate subjective impression of conditions in each area. As expected, it proved impossible to implement the entire data collection plan at any site due to the limited availability of data and to time constraints.

In addition to the quantitative information being sought, the visit teams attempted to develop qualitative information as supplements or substitutes for the quantitative measures. The focus was on health status, unmet need, and unmet demand, with the specific qualitative indicators to be developed in the interviews.

Quantitative Findings.

A number of measures were obtained in approximately the same manner and with approximately the same degree of reliability for all or most of the communities studied. These measures were then compared to the area's HMSA rating to determine if use of the various measures would rank the areas similarly. The measures used in the analysis are listed, with some limited explanation provided where needed.

> HMSA Priority Current Data. The Primary Care Health Manpower Shortage Area priority ranking of each area recomputed with the best currently available local data.
>
> Average Tract HMSA Priority Score. The average of the priority rankings assigned currently under the Federal designation program to the census tracts or minor civil divisions which comprise each of the communities studied. Tracts which were not part of designated shortage areas were arbitrarily assigned a shortage rank of 05 (other tracts are ranked from 01 to 04) so as to include them in the calculations without allowing them to dominate the average scores shown.
>
> Percent Area now HMSA Designated. The ratio of census tracts or minor civil divisions currently Federally designated to the total number of such units in the area. This was used as a rough indicator of the proportion of each locality's population which is currently recognized as affected by primary care shortage.
>
> IMU Score. The index used to identify Medically Underserved Areas, based on infant mortality rates, the primary care provider-to-population ratio, the percent of the population 65 years of age and older, and the proportion of the population with less than a poverty level income. Low values indicate high medical underservice.
>
> Predicted Percent of Population Underserved. A statistical index based on recent findings of the relationship between shortage area designations and both physician supplies and population characteristics in urban areas.
>
> Population per Full-Time Equivalent (FTE) Primary Care Physician The full-time equivalent provider count used in identifying shortage status.
>
> Population per Patient Care Physician. A component of the Predicted Underserved Population percent indicator which normally varies together with, but more widely than, the true value of Population-per-Primary Care Physician. It provides a check on the accuracy of the primary care supply measure and also measures the supply of specialists who provide some primary care.

Infant Mortality Rate. A component of the IMU measure of underservice and the current HMSA designation criteria. It is believed to be an indicator of the health of young children, mothers, and probably, young male adults;

Ages 45-64 Mortality Rate. An indicator on some aspects of health status among the middle aged.

Percent Ages 65 and Over. Measures the elderly proportion of the population which generally has particularly high needs for and high utilization of health care.

Fertility Rate. Indicator of needs for prenatal and pediatric care, which tends to be high in communities with low incomes and poor health maintenance practices;

Teen Fertility Rate--Percent of Births Out-of-Wedlock. Variables which generally reflect social and health conditions of persons at high risk for unfavorable health outcomes. They tend to signal the presence of a particularly needy cohorts in a population; and

Percent Poverty. The ratio of poor persons to the size of the total population.[1]

The findings from of the comparisons of these measures with the HMSA are discussed below and displayed later in this Appendix.

Two of the 26 areas, both from West Virginia, received consistently high priority rankings[2] from the various measures compared regarding their need to be designated. Both areas received a top priority rank (01) based on HMSA criteria as recomputed using current local data. Their average priority scores from the formal HMSA designation (averaging the degree-of-shortage for each tract of division included in the area studied, with undesignated tracts or divisions assigned a degree-of-shortage of 05) is also 01, or the top priority, and their IMU scores are the lowest of the

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[1] The area measures of poverty used locally differed considerably from this general definition. The measure used in New York, where Medicaid eligibility rules are relatively generous, is the proportion of the population eligible to use Medicaid services. In West Virginia, the poverty rates used were for 1970 and were only at the county level even where the study areas were smaller than counties. The poverty measure in California was a county estimate whose degree of error and possible bias could not be assessed.

[2] It should be pointed out that this examination deals largely with the degree of shortage rankings rather than with the issue of designation versus no designation. In other chapters of this report, the degree of shortage categories are analyzed in more detail.

26 areas (indicating substantial underservice). The only measures for which the areas did not receive a high ranking were indicators of fertility. For one of the two, the overall fertility rate was moderate. For the other, both the overall fertility rate and the teen fertility rate were moderate.

Consistency among the rankings on the various measures was not maintained for the other 24 areas. Thirteen areas received the second highest priority (02) from the HMSA criteria when recomputed with current local data, but their officially designated priorities ranged from top priority to low priority.

The percent of the census tracts that are currently designated in these areas varied from all to none. The Index of Medical Underservice scores also appeared to be unrelated to either the recomputed HMSA priority or the official HMSA designation. The predicted percent of the population living in shortage areas (see definitions) was fairly consistent with the recomputed designation priority but was not completely consistent with the HMSA priority levels, and was the only one of the measures which was in reasonable agreement with either HMSA priority ranking.

The 11 remaining areas received a recomputed priority ranking of 03 or 04, or were identified as not being designatable--an assigned ranking of 05. The inconsistencies between measures extends to these areas also. For the seven 05 areas, the percent of their tracts currently designated ranged from 0 percent to 79 percent; their average official priority rankings ranged from 02.18 to 05.0; their IMU scores ranged from 44 (one of the lowest) to 83 (the highest); and their infant mortality rates ranged from the best to among the worst. Similar variation occurs for the three 04 areas.

Some individual cases are of particular note. Central Harlem, one of the New York areas, had a recomputed HMSA priority of 02, but an average official HMSA priority of 3.71, with 68 percent of its tracts not currently designated. In addition, it had the poorest health status of any of the communities studied, as measured by mortality and fertility rates, and the second worst IMU score.

Another New York area, Washington Heights, had 81 percent of its tracts designated at the 01 level, but had only a moderate level of poverty, reasonably good indicators of health status, and apparently ample supplies of patient care physicians (not identifiable as to whether they were primary care or not). This area abuts Central Harlem but has quite different characteristics from its neighbor.

Finally, one Los Angeles area was indicated as having a good deal of poverty and was remote from the center of its metropolitan area. Its recomputed designation priority was 02, but currently none of its tracts were officially designated. On the other hand, its IMU score was above the median for the 26 areas, and it had reasonably good health status indicators.

Table E-1

Comparison of Health Care Shortage Related Characteristics of Selected Small Areas in West Virginia, New York and Los Angeles County California: Ordered by Currently Appropriate PCHMSA Designation Priority and by Population per Full Time Equivalent Primary Care Physician

Primary Care Shortage Designation

Area 1	Priority Based on Current Data	Average Priority Score of Census Tracts[1]	# of Tracts with PCHMSA Designation at Present	IMU Score[2]	Predicted # of Population Underserved[3]	Population per FTE Primary Care Physician[4]	Population per Patient Care Physician[5]
WV5	1	1.00	100	43.4	100.0	6927	2073
WV4	1	1.00	100	42.7	100.0	6500	4351
LA2A	2	2.00	100	64.4	83.7	7800	6393
WV3	2	1.00	100	64.6	94.6	5720	4582
LA3B	2	2.49	94	68.0	52.1	5300	3834
WV2	2	1.00	100	61.0	91.5	5185	4666
WV1	2	1.00	100	58.2	91.5	5183	4146
LA4A	2	2.16	100	51.1	80.8	4765	4341
LA1A	2	5.00	0	61.0	52.1	4689	3182
LA3A	2	3.00	100	67.4	48.9	4500	3328
NY9	2	3.73	46	51.8	41.9	4436	667
NY4	2	1.34	91	50.5	51.3	4318	1360
LA5A	2	3.00	100	58.4	69.8	4178	3989
NY6	2	3.01	65	56.8	27.2	4103	223
NY7	2	3.71	32	42.8	41.9	4103	1100[6]
NY5	3	3.77	46	64.3	17.9	4498	443
NY8	4	1.75	81	65.9	17.8	3739	186
WV6	4	4.00	100	61.0	80.0	3125	3125
LA4B	4	3.32	67	57.5	33.9	3000	1494
NY1	ND[7]	2.54	77	58.1	25.1	3309	347
NY10	ND[7]	3.75	42	71.3	10.4	3146	158
NY2	ND[7]	2.18	77	46.0	34.7	2922	605
NY3	ND[7]	3.30	79	44.0	56.6	2916	783
LA1B	ND[7]	4.37	23	76.6	10.9	2500	1050
LA5B	ND[7]	3.64	81	74.3	20.4	2100	1162
LA2B	ND[7]	5.00	0	83.5	13.7	1500	996

Exhibit E-1 (Continued)

Area 1	Infant Mortality Rate[8]	Ages 45-64 Mortality Rate[9]	# Ages 65 and over	Fertility Rate[10]	Teen Fertility Rate[11]	# Births out of Wedlock	# Poverty Population[12]
WV5	24.5	794	14.5	74	66	NC	22
WV4	20.1	904	12.7	76	72	NC	29
LA2A	10.7	928	6.1	93	NA	NA	17
WV3	6.8	663	9.2	69	34	NC	17
LA3B	10.9	800	5.5	81	NA	22	10
WV2	13.7	1144	11.9	68	65	NC	17
WV1	13.7	1144	11.9	68	65	NC	19
LA4A	17.1	1096	4.0	89	NA	NA	26
LA1A	14.8	929	6.1	107	NA	NA	17
LA3A	11.7	890	7.7	105	NA	NA	12
NY9	11.0	1342	17.2	85	NA	NA	27
NY4	19.1	1213	6.7	75	87	65	26
LA5A	14.1	1146	7.0	112	NA	NA	21
NY6	15.8	1293	11.0	59	56	57	20
NY7	26.5	2697	15.6	73	92	77	21
NY5	15.0	940	14.7	61	40	33	10
NY8	13.0	1291	12.1	83	NA	NA	13
WV6	19.2	923	10.5	71	82	NC	27
LA4B	18.1	1016	5.6	91	NA	40	21
NY1	16.4	1100	16.9	76	NA	NA	18
NY10	12.0	1128	13.1	37	37	37	8
NY2	22.2	1288	5.5	96	103	68	31
NY3	21.7	1782	6.1	89	89	69	37
LA1B	8.3	752	7.9	61	NA	15	8
LA5B	11.2	972	9.2	94	NA	24	14
LA2B	11.2	869	10.1	69	NA	23	11

Table E-1 FOOTNOTES

NOTES
The names of the areas are provided on page E-13. In New York City, the basic unit of analysis was the Health District, as used for service planning by local government. New York Health Districts may contain parts of several designated HMSA's. In West Virginia, all areas studied were designated PCHMSAs, as data for other localities were not sufficiently plentiful for analysis. In Los Angeles, two basic types of areas were used. These are the "study area subdivisions" defined by the State for its own shortage area manpower programs and the "Health Districts" defined by the county for service delivery and planning. All Los Angeles study areas shown are contained in one or more of the Health Districts shown.

NA - Not Available
NC - Not Collected

1. Census tracts without a shortage designation were arbitrarily assigned a score of five (5) so that they could be included in the calculation. Overall this minimizes the differences between values in this column and those to the left. The priority ranks of other tracts were copied from the Federal Register.

2. The Index of Medical Underservice is used in allocating primary care funds under sections 329 and 330 of the Public Health Act. Low scores on the index indicate high levels of need. A score below 62 is required if an area is to qualify for Federal primary care funds.

3. The prediction values shown in this column are based on a statistical analysis of the relationship between the proportion of the population in urban counties living in designated PCHMSAs and the physician supply and population characteristics of those counties.

4. The primary care physician counts used (except in LA1B through LA5B) are those developed by applicants for local shortage area status or for reduced IMU scores. By and large, these estimates are not reliable and do not conform with the standards set by the regulations. Further, the quality of these estimates is quite varied.

5. Based on a variety of data sources which, collectively, probably undercount the patient care physician supply in Los Angeles and West Virginia somewhat.

6. This value is probably a slight underestimate. The data source was incomplete.

7. These areas should not de designated given their characteristics and the criteria stated in the PCHMSA regulations.

8. Per 1,000 live births.

9. Per 100,000 population (1980) ages 45-64.

10. Per 1,000 women ages 15-44.

11. Per 1,000 women ages 15-19. The numerator in New York as all teen births. Elsewhere the numerator is births to women 15-19.

12. The data used are of varied quality and timeliness. Los Angeles (prefix LA) provided 1980 estimates. In New York City, Medicaid eligibility was used as a surrogate for poverty status.

Personal Interview Findings.

A number of personal interviews were also conducted in each case study location to enhance the very limited statistical findings and to probe the designation issues suggested by the data but which could not be quantitatively evaluated as adequately as would have been desirable. The thrust of these interviews was directed at determining how local officials felt the conceptual and structural basis of the HMSA designation criteria could be improved to better identify locations with primary care physician shortages. The interviewees included clinic officials, private practitioners, HMO staff members, local health department officials, state health agency personnel, local academians concerned with health care delivery, Health Systems Agency experts, and Federal Regional Office staff members. 3/ All interviewees cited some concerns about some aspect of the HMSA designation criteria. By and large, interviewee views and impressions did not conflict with one another, but rather provided different perspectives on the same areas of concern. However, concrete suggestions for specific improvements in the HMSA criteria and process were not offered by all interviewees. In addition, many of the concerns cited related more to overall health care delivery system problems and general health status, financing, and organizational issues than to manpower shortage designation issues.

A prevalent concern expressed by the interviewees was that the reasons for medical underservice were more general and complicated than simply insufficient numbers of primary care physicians. They felt that a coordinated public health approach, using different types of remedies, was needed to cope with the underservice problems in their areas. More than a few stated that the problem of primary care underservice was less one of a physician shortage than it was of a lack of financing and of health care organization designed to mobilize teams of health care professionals. In essence, the major concern appeared to be the lack of a rational and integrated system of publicly guided health care resources to cope with the health problems of qualifying communities rather than specific weaknesses of the HMSA program.

The interviewees also commented on many of the specific provisions of the HMSA criteria. Comments were made about the procedural aspects of application for area designation, the concept of "rational service area," the population adjustment guidelines, the primary care physician counting provisions, the contiguous areas provisions and the degree-of-shortage provisions. Each of these topics are discussed below.

Applications for designation as a shortage area are generally submitted by communities, local agencies, or non-profit clinics, among others, as the first step in the process of obtaining the services of a National Health Service Corps physician. Ideally, the designation procedures outlined in section 332 of the PHS Act and the associated review of

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3/ Views of all interviewees are weighted equally, regardless of their position, knowledge of the HMSA program or accuracy of their statements.

designation requests by HSAs, SHPDAs, and Governors should ensure examination of all parts of an HSA's jurisdiction in a uniform way so that requests for designation could be submitted for all qualifying locations and the reviews of requests done within a broad HSA-wide context. However, many interviewees indicated that this has not happened, and that instead: (1) No comprehensive overview of an HSA is developed to guide governmental responses to local health care needs; (2) The data in individual shortage designation applications are of little use for comparing areas with one another since each of them are prepared by groups who have a vested interest in demonstrating a high degree of shortage of that particular locality; (3) Very few private practices (i.e., Health Maintenance Organizations or group practices) find it worthwhile to undertake the expense and trouble of preparing a designation request since the potential benefits are limited and the outcome (NHSC placement) uncertain; and (4) Few shortage areas which might support Private Practice Option providers in private settings have been clearly identified, either through the criteria themselves or through the NHSC's subsequent review of applications for possible placement. Local and state government health officials were also concerned that the designation procedure failed to provide a comprehensive assessment of all parts of their jurisdictions. They urged that means be found to ensure more consistency among areas regarding the above issues.

The definition of a "rational service area" stimulated a number of comments. At one extreme were those who would limit such areas to small geographic zones with a high degree of ethnic and socioeconomic homogeneity. At the other extreme was one individual from a major health care organization who stated that the size of areas relevant for market analysis is and should be quite large, even in cities.

Most interviewees did not believe that a physically large rational service area for provider location planning would mean that travel time for patients would necessarily be great. The vast majority of ambulatory care users, according to the interviewees, traveled by auto and took less than twenty minutes to reach their providers. This was believed to be almost as true for the poor as for others, even extending to those in Los Angeles who did not own an automobile. By and large, such people were reported to be able to borrow a car or get a ride with a friend when they go to a clinic or other service site. A 20-minute travel radius about a single point in Los Angeles, for example, covers an area of roughly 700 square miles. Furthermore, all three subcounty areas studied in West Virginia were almost entirely within a 20- to 30-minute driving range of the center of their neighboring metropolitan areas. In New York, where auto travel is somewhat slower and less likely by the poor, it was believed that most of the Health Districts could be crossed on foot or subway in thirty minutes or less.

The primary care HMSA provisions for adjusting population counts to reflect the different expected utilization rates in different age groups was viewed as unnecessary by almost everyone interviewed. Making the adjustments appeared to require quite a bit of effort and to make very little difference in the designation result or in applicant's understanding of the service needs in their communities.

Primary care practitioner counts were viewed as a problem, particularly in urban areas. They are difficult for most local authorities to complete, are prone to serious errors, and seem to be easy for applicants to manipulate to their advantage. The starting point for these counts in the West Virginia locations visited was information from the bienniel state licensure survey. In the New York and California locations, the telephone Yellow Pages was the key resource. Progress beyond these elementary starting points was particularly difficult in the city locations, where it was necessary to check medical association files to determine specialty and to phone physicians to determine their office hours. Developing better counts was deemed to be very expensive.

One interviewer from an agency with responsibility for 11 contiguous catchment areas reported spending $35,000 to count FTE primary care physicians. The medical society in the same county reportedly spent $10,000 to determine the number and distribution of primary care physicians and then abandoned the effort because it ran out of funds.

A number of suggestions were offered for improving the reliability of the physician counts and for making them easier to complete. The New York City Health Department suggested that Drug Enforcement Administration licensure tapes be used as a primary resource, with the license applications expanded to include specialty, age and principal activity so as to facilitate counting. The advantages of this information source were that: (1) it is updated once a year; (2) licensees almost always list principal place of practice, as required by regulation; and, (3) most non-practicing physicians avoid the inconvenience and expense of applying for a license, thus eliminating themselves from the provider count.

Another suggestion was that all patient care physicians be counted, not just self-defined primary care specialists. It was noted that virtually all physicians provide some primary care and that limited specialists are particularly likely to provide such care where they are available in large numbers.

On the other hand, other interviewees believed that, except in areas with major teaching facilities, the proportion of physicians that would have to be discounted to arrive at a full-time equivalency figure would be roughly constant across localities. This would mean that major area surveys could be limited to such facilities and that centralized data sources could be used to count other physicians.

Aside from making the above suggestions and observations about the process of counting physicians, interviewees seemed to feel that a central body, presumably the federal government, should publish a consistent set of population/primary care physician ratio estimates for all "market areas." Just how this might be done was not clear, however.

Several of the contiguous area considerations listed in the criteria were considered to be difficult to employ for analysis of shortages. The major exception to this was the counting of contiguous area physicians. The assessment of linguistic/cultural/socioeconomic barriers to contiguous areas, and the delineation of physical barriers to access to contiguous areas seemed to be fairly casually and often inaccurately described. It was felt that designation requests tend to undercount physicians not accepting Medicaid, and that other accessibility barriers tend to be assigned their highest plausible values. Linguistic and cultural barriers also tend to be described in absolute terms when, in fact, they do not operate in this fashion.

Very little direct comment on the degree-of-shortage determination criteria was offered during the case studies. However, a summary of the interview findings gives some indication of the local perception of their appropriateness. Given the concern of most interviewees that "neediness" is not given enough weight in shortage area assessment, it is fair to say that the stated population-to-provider ratio criteria for "high needs" areas are perceived as too stringent, especially in densely-populated cities like New York. Also, emphasis was given by interviewees to the importance of conditions conducive to high physician productivity levels; this seemed to imply that the degree-of-shortage and/or priority rankings should consider the apparent number of "physician openings."

Other observations on degree of shortage determinations centered on the tendency of new providers to enter into existing job vacancies rather than to pioneer new practices. Local observers pointed out that this tendency was strong. Further, they suggested that the work setting preferences of new physicians should be accepted, since physicians must often be teamed with other resources and in health care programs if they are to be effective in meeting the needs of the underserved. The implication of these comments seemed to be that the population-to-physician ratio criterion for a high degree-of-shortage should be reduced in high needs areas with documented openings for additional physicians in existing clinics, private practices, and HMOs as well as in rural areas with openings in clinics planned by local organizations.

Table E-2

Small Areas Included in the Case Studies

NEW YORK CITY

NY1	Fordham section of the Fordham-Riverside Health District, Bronx County
NY2	Tremont Health District, Bronx County
NY3	Morrisania Health District, Bronx County
NY4	Mott Haven Health District, Bronx County
NY5	Westchester Health District, Bronx County
NY6	East Harlem Health District, New York County
NY7	Central Harlem Health District, New York County
NY8	West Central Harlem (Washington Heights) section of the Washington Heights Health District, New York County
NY9	Inwood section of the Washington Heights Health District, New York County
NY10	Riverside Health District, New York County

WEST VIRGINIA

WV1	Cedar Grove Service Area, Kanawha County
WV2	Cabin Creek Service Area, Kanawha County
WV3	Blacksville Service Area, Monongalia County
WV4	Preston County
WV5	Taylor County
WV6	Nicholas County

LOS ANGELES COUNTY, CALIFORNIA

LA1A	San Fernando/Pacoima Subdivision consisting of portions of the San Fernando and East Valley Health Districts
LA2A	Baldwin Park Subdivision, a portion of the El Monte Health District
LA3A	El Monte Subdivisions (North and South), a portion of the El Monte Health District
LA4A	Compton Subdivisions (East and West), a portion of the Compton Health District
LA5A	Maywood/Bell Subdivision, a portion of the San Antonio Health District
LA1B	San Fernando Health District
LA2B	East Valley Health District
LA3B	El Monte Health District
LA4B	Compton Health District
LA5B	San Antonio Health District